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OBSTACLES ON THE ROAD TO SCHOOL: THE IMPACTS OF MOBILITY RESTRICTIONS ON EDUCATIONAL PERFORMANCE

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Abstract

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1 Introduction

Conflicts have adverse impacts on individual and aggregate human capital accumulation, impeding the long-term development of countries under strife (Justino, 2012; UNESCO, 2011). A growing literature illustrates the negative impact of conflict-related violence on educational attainment, an important aspect of human capital accumulation that often serves as stepping stones for good future labour market outcomes (Brück et al., 2019; Leon, 2012; Monteiro and Rocha, 2017). This literature has not explored the impacts of another prominent feature of contemporary conflicts: conflict infrastructures such as walls, barriers, and buffer zones (Pullan, 2013).[1] These conflict infrastructures often result in restricted mobility and affect the daily routine of those living in close proximity; for example, by increasing travel costs required to arrive at school. Despite the major role played by conflict infrastructures in contested areas, little is known about their impact on the educational performance of students.

This paper investigates the impact of conflict infrastructure and resulting mobility restrictions on the educational performance of high school students. We study this question in the context of the Israeli-Palestinian (IP) conflict over 2000–2006, a period of intensified conflict known as the Second Intifada. We focus on the final high school exam performance of students studying in state schools in the West Bank. This context offers a unique setting to study this question. First, a prominent feature of the IP conflict is the system of mobility restrictions enforced in the West Bank through various physical barriers. The most prominent of these barriers are checkpoints which Palestinians often cross to commute between Palestinian villages and between Israel and the West Bank. These checkpoints are usually manned by Israeli security personnel who conduct checks on Palestinian commuters. Second, exam outcomes in this context have important implications for young Palestinians.

[1] Recent examples of conflict infrastructure include the buffer zone in Nicosia during the Greek-Turkish crisis, the Berlin wall between 1961 and 1989, peace walls in Northern Ireland, the green line between Sunni and Shia communities in Beirut, the main Boulevard in Mostar which divides East and West, and contested lands in Kirkuk (Pullan et al., 2012).

Achieving a high exam score is a necessary prerequisite for admission to university and to apply for well-paid public sector jobs. This is the first study that examines the impact of conflict-related mobility restrictions on educational performance.

We use several unique data sources on conflict exposure and educational performance. Our data has at least three advantages. First, it allows us to measure the multiple dimensions of the IP conflict, including exposure to conflict infrastructure such as checkpoints, our primary measure of mobility restrictions, and exposure to conflict-related violence such as fatalities. This allows us to distinguish between the impacts of conflict-related violence, which have been the focus of the existing literature, and those of conflict-related mobility restrictions which are the focus of this study. Second, it allows for a granular measure of exposure to conflict. We construct measures of conflict both at the school locality level (a geographic area with an average size of 8.5 km^2) or at the school locality and home locality pair level.[2] Third, supplementary data allows us to explore the mechanisms underlying a potential relationship between conflict and educational performance.

We use two complementary empirical strategies to examine the effect of exposure to conflict in our setting. Our first empirical strategy, the *within-school specification*, exploits variation across academic years in (a) the presence of physical barriers surrounding a given school and (b) the quantity of fatalities occurring in the school locality in the months leading up to the exam. This specification enables us to identify the effects of the introduction of at least one barrier within 10 km of the centre of the school's locality on academic performance. Our second empirical strategy, the *barrier matrix specification*, is a within-home locality and within-school locality specification that exploits variation across time in the probability that a student faces a barrier along the shortest route to school.[3] While our first empirical

[2]In particular, using information on the student's home and school locality as well as data on the location of barriers, we construct measures capturing whether a particular student encounters a barrier on the shortest route to school in the year they sit the exam.

[3]This specification is grounded in the gravity equation commonly found in the trade literature. More specifically, the *barrier matrix specification* includes both home locality and school locality fixed effects, but doesn't include fixed effects for each home locality-school locality pair.

specification estimates the effect of the introduction of barriers surrounding a school, the second specification estimates the effect of encountering barriers on the road to school.

Our baseline results provide strong evidence that exposure to mobility restrictions in the form of checkpoints have adverse impacts on educational performance. The introduction of at least one checkpoint within 10 km of the center of the school locality reduces the probability of passing the TGE by over 1 percentage point (pp) and the overall exam score by 0.037 standard deviations. The effects of encountering a checkpoint on the road to school are even more detrimental. It reduces the probability of passing by 3.05 pp and the overall exam score by 0.071 standard deviations.

The magnitude of these effects is larger than our estimates of the impact of an additional fatality in the school locality. Conditional on exposure to barriers, an additional fatality in the school locality reduces the probability of passing by 0.07 pp and the overall exam score by 0.001 standard deviations. The estimated impacts of mobility restrictions are also comparable in magnitude to the impacts of other inputs into the education production function examined in the existing literature. For example, the estimated impact of encountering at least one checkpoint is equivalent to one-half to two-thirds of the decrease in exam scores associated with a one standard deviation decrease in teacher quality in the US (Rivkin et al., 2005; Rockoff, 2004).

The effects of mobility restrictions on educational performance appear to be heterogeneous along several dimensions. The effects vary across exam subjects, with Maths exam scores being particularly adversely impacted. Different types of barriers have different effects on educational performance: checkpoints have strong adverse impacts whereas other barriers such as roadblocks, earthmounds, and gates do not appear to have an adverse impact.

We demonstrate the robustness of our findings to several alterations to the baseline specifications. For the within-school specification, including additional locality-level time-varying characteristics that may be correlated with the introduction of checkpoints and affect academic performance does not add to the explanatory power of the model and does not affect the baseline estimates. For the barrier matrix specification, when we interact home and school locality fixed effects with academic year fixed effects to allow for time-varying home and school locality unobserved characteristics, the estimated impact remains very stable. When we include fixed effects for each home locality and school locality pair, the estimates are very similar to the baseline results. Our results also do not seem to be driven by other potential confounding factors such as students moving endogenously within the West Bank in response to conflict or sample selection of students sitting the exam.

We investigate several mechanisms that might give rise to a negative relationship between conflict and educational performance. First, it has been documented that mobility restrictions impede the movement of goods and people across the West Bank (Calì and Miaari, 2018; World Bank, 2004), potentially affecting school resources. We find some evidence that the introduction of checkpoints within 10 km of the school locality centre reduces the number of total teachers by over 1% and reduces the probability that a school has a science lab by 5.6 pp. In contrast, fatalities occurring near the school vicinity does not affect school resources. This suggests that by restricting the mobility of goods and people, checkpoints worsen the school environment and reduce academic performance.

Second, we supplement our main administrative dataset with survey data for a younger sample of students to investigate whether mobility restrictions have adverse impacts on the psychological wellbeing of students. We find that exposure to conflict increases cognitive scarcity. The presence of one or more checkpoints within 10 km of their home locality significantly increases the probability that students report suffering from a lack of concentration. Exposure to checkpoints around the home locality also increases tendencies towards violent behaviour.

Lastly, we use newly collected data on delay factors incurred at specific checkpoints across the West Bank to examine whether the time loss (e.g. for studying) due to delays at checkpoints could explain the impact of checkpoints. We find that each additional minute delay reduces the probability of passing the exam by 0.11 pp and the overall score by 0.002 standard deviations. Evaluated at 15 minutes delay, the average delay time over this period, this implies that delays can account for over half of the estimated impact of encountering at least one checkpoint on the road to school.

Related Literature. This paper is related to several strands of literature. First, it is most closely related to studies that examine the impact of exposure to conflict-related violence on educational performance. Most similar is Brück et al. (2019) who find that a one standard deviation increase in the number of Palestinian fatalities occurring near a school reduces the probability of passing the exam by 1 pp. A handful of papers examine this relationship in other contexts. Monteiro and Rocha (2017) show that exposure to at least two days of conflict in a favela within 250 meters of the school reduces Maths test scores among fifth-grade students by 0.054 standard deviations. Kibris (2015) finds that each additional security force casualty during the Turkish-Kurdish conflict lowers university entrance exam scores of Turkish students by 0.01–0.02 points, adversely impacting access to tertiary education. A related strand of literature examines the impact of conflict on years of schooling (Di Maio and Nandi, 2013; Justino et al., 2013; Leon, 2012; Shemyakina, 2011; Swee, 2015).

Second, this paper is related to the literature on the impacts of mobility restrictions on labour market outcomes. In this respect, this paper is most similar to Calì and Miaari (2018) who provide evidence that physical barriers in the West Bank have a significant negative effect on the employment and wages of Palestinian workers. Other studies confirm this finding (e.g. Aranki, 2006; Miaari and Sauer, 2011). While some work has looked at the effects of mobility restriction on labour market outcomes, no study directly examines its effects on educational outcomes.

Third, this paper is related to a literature that documents the impact of conflict-related violence on students' cognitive, emotional, and behavioural traits. A large psychiatric and psychological literature provides evidence that students' psychological well-being is an important determinant of academic achievement (Roeser et al., 1998) and that exposure to violence is associated with increased risk of Post-Traumatic Stress Disorder (Hoven et al., 2003; Pfefferbaum et al., 1999, 2000; Schwarzwald et al., 1993). Few studies examine whether exposure to conflict infrastructures, in addition to violence, also adversely impact psychological wellbeing.

This paper is novel with respect to the existing literature in several ways. First, this paper studies the impacts of a different aspect of conflict (mobility restrictions) on educational performance while accounting for other dimensions of conflict such as fatalities. Second, our data allows us to construct granular measures of exposure to conflict infrastructure compared to existing studies (e.g. Calì and Miaari, 2018). Third, our use of multiple novel data sources allows us to explore several mechanisms that might explain such impacts.

Thepaper is structured as follows. In Section 2, we provide details about our setting. In Section 3, we discuss our data sources. In Section 4, we outline our empirical specification and corresponding identification assumptions. In Section 5, we present our main results. In Section 6, we explore potential mechanisms. Finally, Section 7 concludes.

2 Background

2.1 The Israeli-Palestinian conflict and Mobility Restrictions

The Israeli-Palestinian (IP) conflict is one of the longest-lasting conflicts in the world. Following the Six Days War in 1967, the West Bank and Gaza Strip fell under Israeli control. In December 1987, a Palestinian uprising against Israeli control (the "First Intifada") broke out, culminating in the signing of the Oslo Accords in 1993. After a relatively peaceful period following the Oslo Accords, the "Second Intifada" broke out in September 2000, characterized by violent clashes between Palestinians and the Israeli Defence Force (IDF). While there is no official end date to the Second Intifada, violence decreased substantially after

2006. The data used in this analysis focuses on the West Bank and spans the period of the Second Intifada (2000–2006).[4]

A key feature of the IP conflict is the system of mobility restrictions enforced by the IDF for security purposes. This system is enforced through various manned and unmanned physical barriers placed on roads and at the entrance to villages, towns, and cities.[5] The most prominent of these barriers are permanent checkpoints (henceforth, *checkpoints*), which were first imposed in 1995 (Calì and Miaari, 2018).[6] Checkpoints are infrastructures, usually manned by Israeli security personnel, preventing the movement of vehicles and pedestrians without documents deemed adequate by the personnel manning the barriers. The majority of permanent checkpoints are located well within the West Bank (internal checkpoints) and increase the commuting cost of travelling within the West Bank. The remaining (external checkpoints) are the last inspection points before entering Israel. Over this period, the movement of Palestinians in and out of Israel was controlled by a permit regime.

There is no standardized procedure to cross checkpoints. Who can cross and when they can cross depends on the type and location of the checkpoint (external or internal) and how frequently it is staffed.[7] Whether commuters can cross a checkpoint by foot or car also depends on various factors.[8] Survey evidence suggests that the majority of students who cross checkpoints do so by foot.[9]

[4]Several studies use 2005 as the end date of the Second Intifada. Our results are robust to dropping 2006 data.

[5]In the 1990s, this system was loosely enforced. However, following the outbreak of the Second Intifada, this system of mobility restrictions was strengthened.

[6]In contrast to permanent checkpoints, "flying" checkpoints are temporary and may be erected along roads in the West Bank at short notice.

[7]See `https://www.btselem.org/freedom_of_movement/checkpoints_and_forbidden_roads` for examples of rules for crossing current checkpoints in the West Bank and Gaza Strip.

[8]During the Second Intifada, Palestinian vehicles were restricted from crossing external checkpoints (Braverman, 2011). Some internal checkpoints allow both cars and pedestrians. Most internal checkpoints within the district of Hebron can only be crossed by foot.

[9]There are few analyses that discuss which mode of transport students use to travel to school and our primary dataset does not contain information on how students get to school. An additional survey dataset (the *wellbeing survey* used in Section 6) indicates that among students between 10 and 17 years old, the majority (over 70%) travel to school by foot. For this reason, it seems appropriate to assume that those who cross checkpoints on the road to school are likely to do so by foot.

Despite a lack of uniformity in checkpoint-crossing procedures, the process usually involves several features (Braverman, 2011, 2012). At internal checkpoints that are manned by security staff, commuters are usually required to form a single-file line and are processed one at a time by showing their identification card (B'Tselem, 2007b). At external checkpoints, the checks involved are more stringent. Commuters must first present their crossing permit and pass through a revolving metal gate ("carousels") equipped with a metal detector (OCHA, 2006; Rijke and Minca, 2019). This activity is monitored by soldiers and security guards working at the checkpoint. At checkpoints that allow vehicles, drivers must also exit their vehicle so that it can be searched. Delays incurred at checkpoints vary depending on various factors such as the traffic volumes, the number of personnel present, and even the mood of those guarding the checkpoint. Interviews with checkpoint commuters suggests that the average waiting time at checkpoints over this period was 15 minutes and can be as long as 3 hours (B'Tselem, 2007b; Eklund, 2010; Eklund and Martensson, 2012).

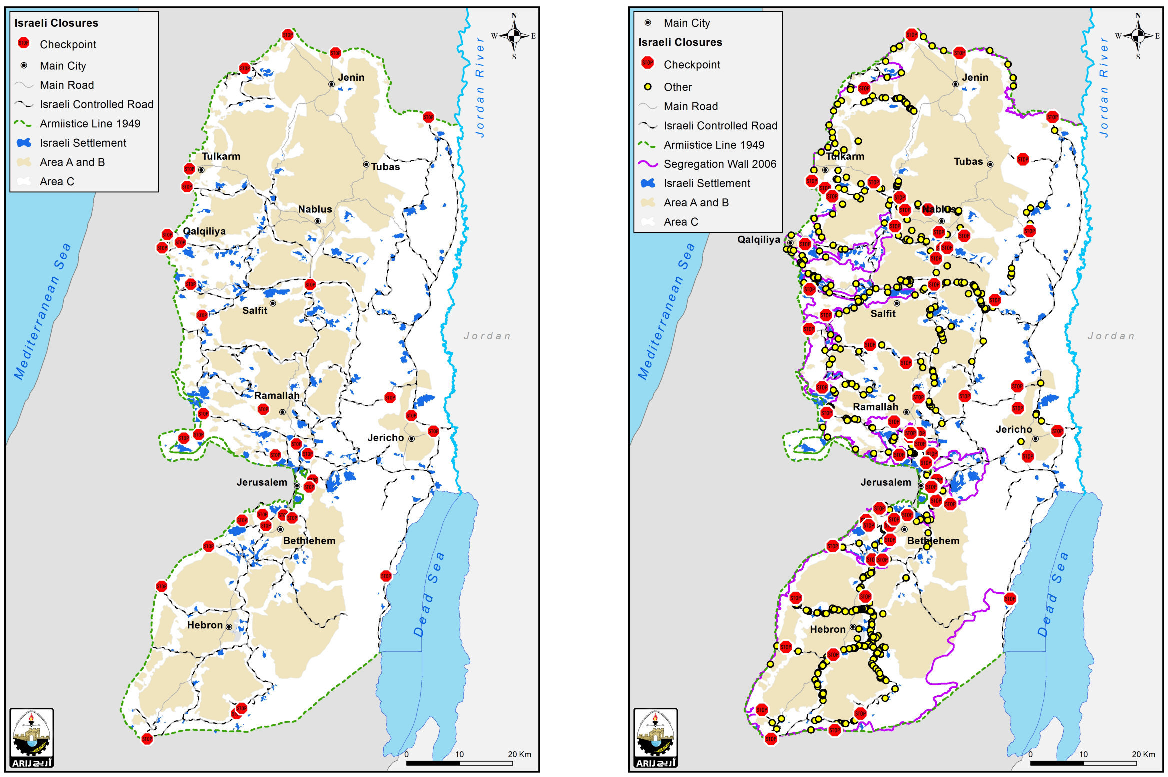
In addition to permanent checkpoints, other types of physical barriers (henceforth, *other barriers*) have also been erected since 2001 across the West Bank to prevent vehicular movement. These barriers include roadblocks (concrete blocks stretched across roads), earth mounds (mounds of rubble), and gates (road, agricultural, and barrier gates). These other barriers are likely to affect commuters who travel by vehicle rather than foot.[10] In addition, a separation wall (the "West Bank wall") was constructed in 2002 mostly along the Green Line, the internationally recognized border between the West Bank and Israel.[11]

Figure 1 depicts two maps of the West Bank at the start and end of our sample period. The maps indicate the location of checkpoints in large red circles and the location of other physical barriers in smaller yellow circles. The separation wall is depicted by the purple solid line. The maps firstly indicate temporal variation in the number of physical barriers scattered

[10]While commuters who travel by foot can circumvent these barriers by foot and then find an alternative mode of transport on the other side if they so wish, vehicles must stop and find an alternative route when such barriers are encountered.

[11]The term "*other barriers*" used in our analysis does not include the separation wall.

across the West Bank. The maps also indicate geographic variation in the physical barriers faced over time. The maps depict the 11 districts in the West Bank,[12] which contain smaller geographic units called localities.[13] In the district of Hebron which contains 12 localities, the average number of checkpoints within a 10 km radius of the locality center grew from 0.25 in 2000 to 5.16 in 2006. In Tubas, the analogous growth in the number of checkpoints was less significant, rising from 0.42 in 2000 to 1.83 in 2006.[14]



(a) West Bank, 2000

(b) West Bank, 2006

Figure 1: These two maps depict the location of barriers in the West Bank in 2000 (subfigure a) and 2006 (subfigure b). Checkpoints, the main physical barrier this paper focuses on, are denoted by large red circles. Other barriers (roadblocks, earth mounds, gates) are depicted by smaller yellow circles. The separation wall is depicted by the purple solid line. *Source:* Applied Research Institute of Jerusalem (ARIJ).

Figure A.1 in Appendix A.1 provides further evidence on how the number of physical barriers changed over time. The number of checkpoints rose from 35 in 2000 to 69 in 2006.[15]

[12]There are 5 additional districts in the Gaza Strip.

[13]As discussed in Section 3, we use localities as our main geographic unit in the analysis below.

[14]Source: Calculated using authors' data sources discussed below.

[15]The decrease in the number of checkpoints in 2004 is due to the numerous internal checkpoints being supplanted by fewer but more permanent checkpoint crossings.(Braverman, 2012).

The number of other physical barriers rose from 120 in 2001 to a peak of almost 600 in 2006, averaging 400 over the sample period. It is estimated that, in 2007, more than 40% of the West Bank area was subject to some form of access restrictions for Palestinians (UN, 2007).

Our identification strategy exploits spatial and temporal variation in conflict intensity, measured by conflict infrastructure and conflict-related violence. Therefore, the placement of physical barriers is an important consideration. Table C.3 compares variable means for localities that saw an above-average number of checkpoints introduced (≥ 2) with variable means for localities that saw a below-average number of checkpoints introduced (≤ 1) over the sample period. Panel A shows that these localities do not differ in terms of economic and labour market outcomes. Panel B shows that the distinguishing feature between these two groups of localities is the size of the Israeli settlement population residing there.[16] Localities that saw above-average number of checkpoints introduced have a larger Israeli settlement population. This is consistent with the IDF statement that the location of checkpoints and other barriers are determined by security factors (Israel Ministry of Defence, 2007): they tend to be located near Israeli settlements and on Israeli-controlled roads that serve as access points to settlements (United Nations Office for the Coordination of Humanitarian Affairs, 2018). Figure 1 shows that localities near East Jerusalem and Bethlehem where there is a large Israeli settler population have numerous checkpoints within a 10 km radius. In comparison, in Jericho where few Israeli settlers reside, the average locality has 1.6 checkpoints within a 10 km radius.[17] Unsurprisingly, localities that have above-average number of checkpoints introduced also see more intense conflict measured by fatalities, prisoners, and other conflict barriers (panel C).

On top of the system of mobility restrictions, another important feature of the IP conflict

[16] This historic settlement policy began in 1967 under the leadership of Israeli Deputy Prime Minister Yigal Allon and was largely motivated by national and religious sentiments (Segev, 2006; Zertal and Eldar, 2009).

[17] We show more formally in Table D.7 that the location of checkpoints and other barriers is primarily determined by the location of the historic Israeli settler population, rather than determined by contemporaneous socio-economic factors which may influence educational performance.

is the numerous violent actions perpetrated by both Palestinians and the IDF. The killings of civilian and Palestinian militants, Palestinian suicide attacks in Israel, assassinations of Palestinian leaders, and demolitions of Palestinian houses by the IDF were common occurrences during the Second Intifada. From 2000–2006, there were 703 Israeli civilian deaths, 316 Israeli military deaths, and over 4,000 Palestinian deaths (B'Tselem, 2007a). The evolution of the number of Palestinian fatalities over the sample period is depicted by the green bars in Figure A.1.

2.2 The Education System in the West Bank

The Palestinian Ministry of Education and Higher Education (MoEHE), the body in charge of the education system in the West Bank and Gaza Strip since the Oslo Accords in 1993, places high priority on education. In the West Bank, schooling is compulsory for children between 6 and 16 years old (Grades 1 to 10). Enrolment rates in these grades has been consistently high since the signing of the Accords (UNESCO, 2007). Entry into secondary school is not compulsory and is based on the successful completion and results of Grade 10 education. From 2000–2006, conditional on completing Grade 10, the secondary school enrolment rate is above 80% among students aged 17 to 19, the typical age of secondary school students.[18]

The secondary school education of Palestinian children consists of two years, Grades 11 and 12. The majority of secondary school students (roughly 75%) are enrolled in schools provided by the Palestinian Authority. In secondary school, students specialize in a stream of study within the academic or vocational track.[19] Within the academic track, the two streams include Arts (*Abadi*) and Science (*Elmi*). Within the vocational track, the streams include

[18]Author's calculations using the Palestinian Labour Force Survey.

[19]Until 2006, schools in the West Bank followed the Jordanian curriculum; from 2007 onwards, schools followed an independent Palestinian curriculum. Secondary school education in the West Bank is provided by government schools and private schools.

Commerce (*Tejar'i*), Agriculture (*Zera'i*), and Manufacturing (*Sena'i*).[20] The subject of the exam depends on which stream the student is studying. Correspondingly, the weighting system used to calculate the overall exam score differs by stream (see Appendix A.2).

At the end of Grade 12, students take a final exam called the *Tawjihi General Examination* (TGE). Performance in the TGE is the main outcome of interest in our study and is an important exam for young Palestinians. Achieving a high TGE score (usually 65% or above) is a necessary prerequisite for admission to university in the West Bank and abroad. A good TGE score also enables students to apply for well-paid public sector jobs. An external commission nominated by the MoEHE grades the exam and exam results are public. The TGE period starts at the end of June and lasts for roughly two and a half weeks. The exam for a given subject (e.g. Maths) takes place on the same day in all schools in the West Bank.

2.3 How does conflict affect educational performance?

Educational performance may be hindered by exposure to conflict infrastructure or conflict-related violence for a myriad of reasons. We focus on the following potential mechanisms that are likely to be important in the context of the IP conflict.

School learning environment. Conflict may adversely impact the school learning environment by affecting labour and capital inputs into the education production function. Physical barriers and conflict-related violence may increase teacher absenteeism or make it more difficult to recruit personnel.[21] The physical infrastructure of schools may also be negatively affected as mobility restrictions on goods may impede on the ability of schools to upgrade or replace damaged infrastructure.

Psychological well-being. Exposure to fatalities or daily interaction with security personnel manning checkpoints may impact students' psychological wellbeing and hinder their

[20] The list of vocational subjects was extended in 2007 after the change in curriculum to include hotel and management (*fonduqi*), economics and finance (*iqtesad*), and Islamic studies (*shar'i*).

[21] Testimonies of teachers encountering checkpoints suggest that such mechanisms may be important. See B'Tselem (2011) for a Palestinian teacher's account of crossing a checkpoint.

ability to perform well at school (Schiff et al., 2007; Shany, 2016).

Loss of time for studying. Physical barriers increase the time it takes for students to arrive at school and return home, reducing the time for studying. Interviews with checkpoint commuters during the Second Intifada indicate that commuters have to wait for 15 minutes at most checkpoints (B'Tselem, 2011; Eklund, 2010; Eklund and Martensson, 2012). Furthermore, increased commuting costs may increase student absenteeism (Di Maio and Nandi, 2013; Giacaman et al., 2007; World Bank, 2007a). Conflict-related violence may also result in school closures. Roughly 1,135 school days were lost and 580 schools faced temporary closure during the Second Intifada (Save the Children, 2003).

The aforementioned mechanisms are not mutually exclusive or exhaustive. For example, the time spent waiting at checkpoints may reinforce the psychological stress experienced by students. Additional channels that may reinforce the relationship between conflict and educational performance include perceptions of lower returns to investments in education in labour markets disrupted by conflict and higher discount rates linked to higher mortality risk.

3 Data

This analysis uses several novel data sources to identify the impacts of conflict on the academic achievement of Palestinian children. The main unit of analysis is the exam performance of each student. The two main geographic units at which exposure to conflict is measured are: (a) a locality or (b) a home locality and school locality pair. Localities represent the smallest spatial unit for which economic data is available in the West Bank. There are 660 localities as defined by the Palestinian Central Bureau of Statistics (PCBS) in the West Bank with an average size of 8.5 km^2.[22] Appendix B.1 contains a summary of the data.

[22] The PCBS defines a locality as "A permanently inhabited place, which has an independent municipal administration or a permanently inhabited, separated place not included within the formal boundaries of another locality" (Palestinian Central Bureau of Statistics, 2009). The West Bank is approximately 5,700 km^2; therefore each of the 660 localities is on average 8.5 km^2 in area.

3.1 Education Data

All data on educational outcomes and school characteristics are provided by the MoEHE. We have data for 2000–2006.

Student exam scores and characteristics. Our main data source is administrative data on student exam scores for the population of Palestinian students enrolled in their final year of state high schools in the West Bank. The data contains information on exam outcomes, student demographics (e.g. age, gender, religion), the student locality of residence while in secondary school, stream of study, and an identification number for the school they attend. Henceforth, we refer to this dataset as the *exam scores data*. Our main sample focuses on state school students who are between 17 and 19 years old when they take the TGE.

School characteristics. The *school data* provides information on the characteristics of the universe of state high schools in the West Bank. The school data includes information on the locality of the school and information on the learning environment which may affect student performance (e.g. physical resources such as the number of classrooms and personnel such as the number of teachers).

3.2 Conflict Data

We use various data sources to measure exposure to (a) conflict infrastructure that result in mobility restrictions (e.g. checkpoints) and (b) conflict-related violence (e.g. fatalities). We use conflict data spanning the period 1999–2006.[23]

Mobility restrictions. In collaboration with the Applied Research Institute of Jerusalem (ARIJ), we collect novel Geographic Information System (GIS) data on the location of various physical barriers for each year in the West Bank. The physical barriers contained in this data include checkpoints (permanent and partial), roadblocks, earth mounds, and

[23]Since some of our regressions used lagged conflict variables, data from 1999 is included.

gates (road, agricultural, and barrier gates). We use this GIS data to construct measures of exposure to mobility restrictions at the school-locality level as well as the home locality and school locality pair level. These measures are discussed further in Section 4. We match (calendar) year t measures of mobility restrictions to (academic) year t education data.[24]

Delay factors. We collect novel data on the delay factors incurred at each checkpoint. We conducted a survey in collaboration with ARIJ between January and June 2018 to collect primary data on average delay times at each internal and external checkpoint that we could access. For internal checkpoints, 70 drivers covered the major transport routes obstructed by these checkpoints. GPS data on the car location, time, and speed was collected every 5 seconds during the survey, allowing us to construct the time between when the car entered the checkpoint and exited the checkpoint. For each external checkpoint that serve as entry points to Israel, a sample of labourers and students crossing the checkpoint at the end of the workday was interviewed. More details about this data can be found in Appendix B.2.

A benefit of this delay factor data is that it captures variation in delays between individual checkpoints, reflecting the reality of a lack of uniformity in checkpoint-crossing procedures. A shortcoming is that since this data was collected in 2018, the delay factors collected are likely to underestimate the true waiting times incurred during the Second Intifada given that the intensity of conflict has decreased since then. For this reason, in our empirical analysis, instead of using the absolute magnitude of delay times measured in 2018, we use the relative delay times across individual checkpoints. This assumes that the variation across checkpoints measured in 2018 is similar to the variation across checkpoints over our sample period. This is reasonable given that most checkpoints present in 2006 are still present in 2018 and that the main checkpoints during the Second Intifada still remain the major checkpoints today. For checkpoints that are present over our period but not in 2018, we evaluate the delay factor by the closest similar checkpoint covered by the survey. We follow existing studies

[24]The academic year starts in September and ends in July. The barriers data is collected by ARIJ in the third to fourth quarter of each year.

and assume an average delay of 15 minutes across all checkpoints over 2000–2006 (Eklund, 2010; Eklund and Martensson, 2012).

Conflict-related violence. Our main measure of conflict-related violence is fatalities. The *fatalities data* include information on all Palestinian fatalities due to politically-motivated violence in each month for each locality. This data is collected by the Israeli Information Center for Human Rights in the Occupied Territories, B'Tselem, and has been used in recent economics research on the Israeli-Palestinian conflict (Durante and Zhuravskaya, 2018; Mansour and Rees, 2012).

Other policy measures. Given that the placement of barriers is likely to be determined by the presence of Israeli settlements, in our baseline analysis we make use of data on the location and size of the Israeli settler population in the West Bank.[25]

3.3 Descriptive Statistics

Table 1 provides summary statistics for every other year in our main sample. Panel A presents means of various conflict variables where the unit of observation is a school. The first row shows that the average number of checkpoints within a 10 km radius increases from 1 in 2000 to 3 in 2006. The second row documents the average number of other barriers within a 10 km radius. The third row shows that the number of fatalities is relatively low in 2000, peaks in 2002, and then decreases.

Panel B presents summary statistics for students in the sample where the unit of observation is a student exam taker. The final three rows of panel B report the commuting patterns of students. Over 30% of students attend a school that is in a locality that differs from their home locality ("traversing" students). Since one of our main specification exploits variation in the barriers faced by traversing students on the road to school, Table C.1 in Appendix C.1

[25] In our robustness checks, we also make use of data on the number of jailed Palestinian prisoners in each locality, house demolitions in each locality, and the length of the separation wall between the West Bank and Israel running through the locality. Additional details on these measures can be found in Appendix B.1.

examines whether traversing and non-traversing students differ on observable dimensions.[26]

Panel C presents summary statistics for schools in the sample. The unit of observation is a school. The average number of classrooms in each school is 14 and this figure is fairly constant across all years. The average class size is 37–40 students. The average student-to-teacher ratio is 21–23.

The final three rows of the table report the number of schools, students, and localities per year. Both the number of students and schools increased across the sample period. The upward trend in student numbers reflects both an increase in secondary school enrolment rates among the school age population[27] and population growth in the decade before the Second Intifada (Nicolai, 2007; UNICEF, 2010; World Bank, 2007b).[28] The increase in the number of schools partly reflects an attempt to accommodate the larger student population (see Appendix C.2 for more details). Our final sample consists of 542 schools, 146,942 student-year observations, and 276 localities. On average, each locality has 2 schools that teach TGE students.[29]

[26]The statistics suggest that traversing and non-traversing students are similar in terms of baseline characteristics and educational outcomes.

[27]Using the Palestinian Labour Force Survey, we find that secondary school enrolment rates increased from 76% in 2000 to 83% in 2006.

[28]World Bank (2002) reports that the average population growth rate before the Second Intifada was about 4% per year, one of the highest in the world, with about half of the population being under 15 years old.

[29]Conditional on having a school in the locality, the distribution of schools per locality is as follows. 33.33% of localities have one school, 57.97% have two schools, and the remaining 8.7% have three or more schools.

Table 1: Descriptive statistics for sample

	2000	2002	2004	2006
	(1)	(2)	(3)	(4)
A. Conflict variables				
# CP within 10km	0.927	2.480	2.255	2.744
	(1.402)	(2.558)	(3.100)	(2.871)
# Other barriers within 10km	0.927	11.927	9.480	16.002
	(1.402)	(9.963)	(8.625)	(16.127)
# Fatalities in school locality	0.285	6.666	2.227	0.937
	(0.860)	(16.131)	(6.547)	(2.676)
B. Student variables				
Age	18.247	18.250	18.192	18.137
	(0.497)	(0.489)	(0.452)	(0.418)
Female	0.511	0.520	0.525	0.527
	(0.500)	(0.500)	(0.499)	(0.499)
Muslim	0.991	0.992	0.993	0.994
	(0.097)	(0.089)	(0.082)	(0.079)
Art	0.681	0.683	0.673	0.683
	(0.466)	(0.465)	(0.469)	(0.465)
Science	0.276	0.252	0.258	0.240
	(0.447)	(0.434)	(0.438)	(0.427)
Vocational	0.044	0.065	0.069	0.077
	(0.204)	(0.247)	(0.254)	(0.266)
Pass	0.607	0.759	0.730	0.764
	(0.488)	(0.428)	(0.444)	(0.425)
Grade	60.263	65.953	63.069	65.313
	(21.153)	(19.826)	(21.449)	(20.856)
School in diff locality	0.359	0.331	0.294	0.300
	(0.480)	(0.471)	(0.456)	(0.458)
C. Classroom variables				
Number of classrroms	13.961	14.108	13.847	13.689
	(4.247)	(4.212)	(3.827)	(3.858)
Class size	37.810	38.997	39.335	40.173
	(7.221)	(8.225)	(7.632)	(7.474)
Student-teacher ratio	23.113	21.674	21.939	20.967
	(4.189)	(3.751)	(6.258)	(4.753)
Teacher experience	8.642	8.197	8.528	8.637
	(3.258)	(3.025)	(3.185)	(2.982)
Num. of students	14,362	18,542	22,920	29,437
Num. of schools	330	371	444	511
Num. of localities	187	210	240	271

Notes: This table presents summary statistics for the main sample. In panels A and C, the averages are taken across schools. In panel B, the averages are taken across students. Standard deviation in parentheses.

4 Empirical Strategy

4.1 Within-School Specification

Our first empirical specification, the *within-school specification*, exploits variation in student-level outcomes across different academic years among students attending a school s. The within-school specification is a natural estimation strategy to begin with because such models exploiting variation in conflict levels in a geographic area close to schools are common in the education literature (Brück et al., 2019; Monteiro and Rocha, 2017).[30] The within-school specification can be written as:

$$y_{islt} = \alpha + \beta^{ws} B_{lt} + \lambda_s + \tau_t + F_{l,t-1}\gamma^{ws} + P_{l,t-1}\eta + X'_{it}\zeta_1 + W'_{st}\zeta_2 + \epsilon_{islt} \quad (1)$$

In equation (1), the dependent variable y_{islt} is a measure of the educational performance of student i studying at school s situated in locality l in academic year t. We use the following measures: (a) whether the student passes the final exam (the student achieves over 50% on all subjects examined), (b) the overall score for the TGE, (e) Maths score, and (d) English score. Although students taking different study streams sit exams in different subjects, all students take exams in English and most students (apart from Agricultural stream students) take exams in Maths. All scores are normalized to be out of 100% and expressed in standard deviations from the mean (calculated using the pooled data for all years).[31]

The conflict variables are B and F. The main conflict variable of interest is B_{lt}, an

[30] To examine the causal impact of drug battles on student achievement in Brazil, Monteiro and Rocha (2017) exploit variation over time in the number of drug battles occurring within 250 meters of a given school during the academic year. To examine the impact of conflict-related casualties, Brück et al. (2019) exploit variation in the number of fatalities over time within Palestinian localities where the school is located.

[31] Since different study streams place different weights on each of these subjects when computing the overall exam score, we normalize the score in each subject by the maximum score achievable in that stream so that the (normalized) maximum score is 100% for each subject in each stream. See Appendix A.2 for information on how the total score is calculated for each discipline.

indicator that equals one if there is one or more checkpoints within 10 km of the center of school locality l in year t and zero otherwise. We focus on checkpoints within this distance because localities are roughly 8.5 km^2 in area and thus schools are likely to be affected by these checkpoints regardless of where within the locality the school is situated. The variable $F_{l,t-1}$ denotes the number of Palestinian fatalities that occurred within 12 months before the exam in the school locality.

School fixed effects λ_s control for unobservable time-invariant differences across school that may influence student performance. The inclusion of these fixed effects implies that β^{ws} and γ^{ws} are identified using within-school across-time variation in the intensity of mobility restrictions surrounding the school and conflict violence occurring within the school locality. This helps deal with potential spurious negative relationships between conflict intensity and educational performance (e.g. if low-quality schools are located in areas with more conflict). Academic year fixed effects τ_t help account for differences in the content and difficulty of the final exam in different years. They also control for the influence of time-varying macro-economic conditions on student exam results (e.g. national education policies).

The remaining control variables are denoted by $P_{l,t-1}$, X'_{it}, and W'_{st}. $P_{l,t-1}$ consists of other policy variables that might influence student achievements and may be correlated with exposure to conflict. In our baseline analysis, we include measures of the Israeli settlement population size within a 10 km radius of the school locality center.[32] The vector X'_{it} consists of student-level characteristics. We include indicators for gender, religion, (calendar) year of birth, and the students' study stream.[33] Year-of-birth fixed effects help control for any shocks common to all students born in the same year. Study stream fixed effects help account for differences across branches in the difficulty and content of the TGE exam. The vector W'_{st} denotes time-varying school-level characteristics (the number of classrooms, the total number of students, the total number of teachers, and a dummy indicating whether

[32] In our robustness checks, we extend this vector to include the number of jailed Palestinian prisoners, the number house demolitions, and the length of the separation wall (in km) going through the locality.

[33] We include dummies for Arts, Science, Commerce, Agriculture, and Manufacturing streams.

the school is mixed-gender or male/female-only). We cluster standard errors at the school locality level.

Our main coefficient of interest is β^{ws}. Given the inclusion of school fixed effects, this coefficient can be interpreted as the effect of the introduction of checkpoints surrounding the school. This effect may differ from the effect of encountering checkpoints in person, since students are not necessarily directly exposed to checkpoints surrounding their school. Given the existing literature's focus on the impact of fatalities, we also report estimates of γ^{ws} in our main tables.

We also estimate variations of equation 1 by interacting B_{lt} with a dummy T_{it} which captures whether student i taking the exam in academic year t attends a school that is located in a different locality to their home locality.[34] This allows the impact of surrounding checkpoints to vary depending on whether the student crosses localities to attend school, a commute that may increase the likelihood of encountering a checkpoint.

Identification assumptions. The key assumption for the OLS estimate of β^{ws} and γ^{ws} to capture the causal effect of conflict is that exposure to conflict is orthogonal to unobservable time-varying school-locality and student characteristics. The first potential threat to our identification strategy is *time-varying omitted variables* at the locality level. There may be unobservable changes at the home- or school-locality level that we cannot control for (e.g. political attitudes or perceptions about threats to security). Second, student characteristics may change in unobservable ways across academic years within a given locality or school. One concern is *endogenous mobility*: higher-ability students may move to localities with fewer conflict infrastructures in response to conflict or move to localities nearer their school to avoid high commuting costs. Another concern is that there is *sample selection* of students

[34]In particular, we estimate:

$$y_{islt} = \alpha + \beta_1^{ws} B_{lt} + \beta_2^{ws} B_{lt} \cdot T_{it} + \kappa T_{it} + \lambda_s + \tau_t + F_{l,t-1}\gamma^{ws} + P_{l,t-1}\eta + X_{it}'\zeta_1 + W_{st}'\zeta_2 + \epsilon_{islt}$$

sitting the exam if conflict affects the probability of students staying on to take the TGE at the end of the academic year. Third, a potential concern is that there is *reverse causality.* For example, if security forces react to an expectation that exam performance is going to worsen in a given locality in year t by placing more checkpoints in that locality, then a negative relationship between mobility restrictions and academic performance would be found.

4.2 Barrier Matrix Specification

We supplement the *within-school specification* with the *barrier matrix specification.* While the former investigates the effect of the *introduction* of checkpoints near a school, the latter investigates the effect of *encountering* a checkpoint on the road to school. This specification uses data on student i's home locality (h) and school locality (l) to construct a measure of the student's exposure to checkpoints on their journey to school in academic year t when they sit the TGE. It exploits temporal variation in the probability of encountering a checkpoint for the one-third of students who live and study in different localities (see Table 1).

When constructing a measure of student i's exposure to checkpoints, we face the challenge that although we observe the student's home and school locality, we do not know the exact route the student took to school and therefore do not know the checkpoints encountered along this route. To address this problem, we first we use network analysis to calculate the distance between all West Bank localities (Ballas et al., 2017; Kharel et al., 2018). When calculating the distance, we assume that (a) the starting and ending points of the route are the centres of the respective localities and (b) the student takes the shortest route on the existing road system. Second, using the GIS data on the location of checkpoints, we calculate the number of checkpoints crossed on the shortest route for a given year. The second step of this method provides us with a "barrier matrix" that contains information about the number of barriers faced when travelling on the shortest route from one West Bank locality to another.

We use the barrier matrix to construct an indicator variable E_{hlt} to measure whether a student living and studying in localities h and l encounters one or more checkpoint on the road to school in year t. Among students who attend school in a different locality, the proportion of students who crosses at least one checkpoint on the shortest route varies across years. In 2000, fewer than 5% of traversing students crossed at least one checkpoint on the shortest route. This figure increased to 17.5% in 2002 and fell in subsequent years to 13% in 2006. We use a binary indicator rather than a count variable because the majority of students (58%) who cross at least one checkpoint crosses a single checkpoint rather than multiple checkpoints.[35] It is worth nothing that although the shortest distance between two localities h and l does not change over time, whether a student encounters a checkpoint along the shortest route from h to l changes across years as the conflict evolves.

Using the constructed measure, we estimate the following regression:

$$\begin{aligned} y_{ihlt} &= \alpha + \beta^{bm} E_{hlt} + D'_{hl}\delta + \rho_h + \sigma_l + \tau_t \\ &+ F_{l,t-1}\gamma_l^{bm} + F_{h,t-1}\gamma_h^{bm} + P_{l,t-1}\eta_l + P_{h,t-1}\eta_h + X'_{it}\zeta_1 + W'_{st}\zeta_2 + \epsilon_{ihlt} \end{aligned} \tag{2}$$

The main variable of interest is E_{hlt}, an indicator for whether a student who lives in locality h and studies in locality l in year t encounters one or more checkpoints on the shortest route to school. We also construct analogous E variables for other barrier types. Since distance travelled is positively correlated with the probability of encountering a barrier, we control flexibly for the distance between locality h and l using a vector of distance bin dummies D'_{hl}.[36] Our distance bins are divided into 0 km (home and school locality are the same), 5 km intervals from 0 km up to 50 km, and then 50 km or above.[37] Furthermore, since students who live further away from their schools might differ from those who live

[35] Among those who encounter a checkpoint on the road to school, the distribution of the number of checkpoints crossed is as follows. 58% cross one checkpoint, 29% cross 2 checkpoints, 11% cross 3 checkpoints, and the remaining cross between 4–6 checkpoints.

[36] Assuming that students who attend schools in different localities travel by the shortest route between the centroids of the two localities, the average distance travelled is 14–15 km.

[37] We also tried classifying distance travelled into deciles. Both approaches produce very similar results.

closer to school, these distance bin dummies help control for student heterogeneity along this dimension.

Home and school locality fixed effects ρ_h and σ_l control for home and school locality time-invariant characteristics that might impact performance. These fixed effects control for student selection into residential areas and into school areas. Academic year fixed effects τ_t account for changes across years. The other variables in equation (2) such as F_{t-1}, P_{t-1}, X'_{it}, and W'_{st}, are as defined previously. Note that F and P are measured at both the home and school locality levels. We cluster standard errors at home-school locality pair level. In our robustness checks, we also allow for multi-way clustering by clustering at both the home and school locality levels.

Our main coefficient of interest is β^{bm}, which can be interpreted as the impact of encountering one or more checkpoint on educational outcomes. Inclusion of home- and school-locality fixed effects means that identification of the β^{bm} coefficient comes from two main sources: (a) within home-locality variation in exposure to barriers across time and across students who attend schools in different localities and (b) within school-locality variation in exposure to barriers across time and across students who live in different localities. The γ_l^{bm} and γ_h^{bm} coefficients are identified using variation in fatality numbers within school-locality and within home-locality across time.

Identification assumptions. There are several threats that may affect whether β^{bm} can be interpreted as the impact of encountering one or more checkpoints on educational outcomes. First, the key assumption for the OLS estimate of β^{bm} in the barrier matrix specification to capture the causal effect of mobility restrictions on educational performance is that the probability that student i encounters (at least) one checkpoint on the road to school is independent of the potential outcomes of that student, conditional on time-invariant home-locality confounders, time-invariant school-locality confounders, distance travelled to school, time-specific confounders, and observable student and school characteristics. Therefore, potential threats to identification include time-varying unobservable student and locality characteristics.

Second, there may be measurement error in the E_{hlt} variable. Students who live and study in the same locality may still encounter barriers on the way to school; however, our method sets the distance travelled to zero and therefore the number of barriers faced to zero.[38] Students who live and study in different localities may take a longer route to school (rather than the "shortest" route selected by our baseline method) in order to avoid having to cross a checkpoint or if the precise location of their home/school is towards the edge of the locality rather than centre. Existing literature demonstrates that in the case of univariate regressions with measurement error in the independent binary variable E_{hlt}, the coefficient would be attenuated (Aigner, 1973). However, for multivariate regressions such as equation (2), the direction of bias is harder to establish. Unfortunately, without observing the exact path that the student took to school, it is difficult to quantify the size of this bias. Given this, we interpret the within-school and barrier-matrix estimates respectively as lower and upper bounds of the impact of (indirect or direct) exposure to checkpoints.

5 Results

5.1 Main Results

Table 2 presents the estimates of β^{ws} and γ^{ws} from the *within-school specification*. Column (1) of panel A shows that the introduction of at least one checkpoint within 10 km of the school locality centre decreases the probability that students pass the exam by over 1 pp, relative to a baseline of 73% of students passing (a 1.4% reduction). This is equivalent to the effect of a one standard deviation increase in the number of fatalities found by Brück et al. (2019). Panel B of this column shows that an additional fatality in the school locality occurring within the 12 months before the exam reduces the probability of passing by 0.07

[38] This phenomenon is common for students living in localities in the district of Hebron. See `https://www.unicef.org/oPt/Story_-_protective_presence_in_Hebron_-_March_2016.pdf`.

pp. Over this period, the average number of fatalities in the school locality was 2.6 fatalities per year. Therefore, this estimate suggests that on average exposure to fatalities reduces the probability of passing by 0.18 pp (0.07×2.6). Column (2) of panel A indicates that the introduction of one or more checkpoints around the school area reduces overall TGE scores by 0.037 standard deviations. This is equivalent to a 0.78 pp (0.037×20.79) decrease in the overall score, relative to a mean score of 64.19% (a 1.20% decrease). Panel B shows that an additional fatality in the school locality reduces overall TGE scores by 0.001 standard deviations.

The findings in these two columns indicate that multiple aspects of conflict – mobility restrictions and violence – have detrimental impacts on educational performance. Comparing the magnitudes of the estimated β^{ws} and γ^{ws} coefficients suggests that the impact of the introduction of one or more checkpoints within 10 km of the school locality is larger than the effect of one additional fatality in the school locality.

Columns (3) and (4) show that the introduction of at least one checkpoint within 10 km of the school locality centre adversely impacts performance in both Maths and English exams, reducing exam scores for these subjects by 0.064 and 0.035 standard deviations respectively. Panel B shows that an additional fatality in the school locality also has a detrimental impact on Maths and English scores, reducing it by 0.002 and 0.001 standard deviations respectively. The results in columns (3) and (4) provide some evidence that Maths scores are particularly sensitive to mobility restrictions relative to English scores. One possible reason for these heterogeneous impacts by subjects is that the inputs required to achieve good scores in these subjects differ. If achieving good scores in some subject requires constant interaction between teachers and students, then if mobility restrictions impact student (or teacher) absenteeism, these subjects will be more adversely affected compared to subjects that require less interaction. The existing literature finds that Maths scores are particularly adversely affected by conflict. For example, Monteiro and Rocha (2017) find that Maths test scores are negatively affected by conflict whereas English scores are not affected.

Table 2: Impact of checkpoints (CPs) near school

	Pass	Overall score	Maths	English
	(1)	(2)	(3)	(4)
A. Mobility restrictions				
$\geq$ 1 CP within 10km	-0.0114**	-0.0368***	-0.0637***	-0.0345**
	(0.0054)	(0.0127)	(0.0137)	(0.0146)
B. Other conflict variables				
Fatalities in school locality	-0.0007***	-0.0013***	-0.0015*	-0.0011*
	(0.0002)	(0.0004)	(0.0008)	(0.0006)
Mean of dep. var.	0.73	64.19	63.37	57.79
SD of dep. var.	0.44	20.79	25.88	22.55
Student controls	Y	Y	Y	Y
School controls	Y	Y	Y	Y
School FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Adj. R-squared	0.120	0.276	0.187	0.344
Observations	146,942	146,942	146,268	146,942

Notes: This table presents estimated coefficients from equation (1) where the obstacles of interest are checkpoints. Scores expressed in standard deviations. All regressions include the following controls: population size of Israeli settlements within 10 km of school locality (in 1000s), student controls (gender, religion, year of birth, study branch) and school controls (number of classrooms, number of students, number of teachers, gender of school). All regressions include school and academic year fixed effects. Standard errors in parentheses, clustered at the school locality level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3 presents estimates of an extended version of equation 1 that interacts B_{lt} with an indicator variable that equals 1 if the student lives and studies in different localities (see footnote 34 for the full equation). This specification allows the impact of checkpoints surrounding the school to differ for students who traverse localities to attend school and those who do not. Column (1) of panel A shows that the introduction of at least one checkpoint within 10 km of the school locality centre decreases the probability that traversing students pass the exam by 1.93 pp but does not have a statistically significant impact on the performance of non-traversing students. Column (2) indicates that the TGE scores of both traversing and non-traversing students are adversely affected by mobility restrictions. In particular, one or more checkpoints within 10 km of the school locality reduces the overall score by 0.035 and 0.041 standard deviations among non-traversing and traversing students respectively. Although the estimated effect on traversing students is larger in magnitude, it is not statistically different. Columns (3) and (4) show that Maths and English scores of both traversing and non-traversing students are negatively affected. This effect is larger in magnitude for traversing students than non-traversing students but the estimated impacts are not statistically different. For example, the introduction of one or more checkpoints reduces Maths scores by 0.060 pp and 0.072 standard deviations for non-traversing and traversing students respectively. Panel B examines the impact of conflict-related violence on educational performance. These estimates are very similar to the estimates in Table 2.

Table 3: Impact of CPs near school on traversing and non-traversing students

	Pass	**Overall score**	**Maths**	**English**
	(1)	(2)	(3)	(4)
A. Mobility restrictions				
(1): ≥ 1 CP within 10km	-0.0085	-0.0351**	-0.0604***	-0.0285*
	(0.0055)	(0.0136)	(0.0138)	(0.0163)
(2): (1) $\times$ Traverse	-0.0108	-0.0061	-0.0117	-0.0220
	(0.0079)	(0.0178)	(0.0167)	(0.0159)
(1) + (2)	-0.0193**	-0.0412**	-0.0720***	-0.0504***
	(0.0082)	(0.0181)	(0.0197)	(0.0156)
B. Other conflict variables				
Fatalities in school locality	-0.0007***	-0.0013***	-0.0015*	-0.0011*
	(0.0002)	(0.0004)	(0.0008)	(0.0006)
Mean of dep. var.	0.73	64.19	63.37	57.79
SD of dep. var.	0.44	20.79	25.88	22.55
Student controls	Y	Y	Y	Y
School controls	Y	Y	Y	Y
School FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Adj. R-squared	0.120	0.276	0.187	0.344
Observations	146,942	146,942	146,268	146,942

Notes: This table presents estimated coefficients from equation (1), modified by interacting the main obstacle variable with an indicator *Traverse* that equals 1 if the student lives and studies in a different locality and including this indicator as an additional regressor (see footnote 34). The same set of control variables and fixed effects are included as in the baseline equation. Standard errors in parentheses, clustered at the school locality level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Our estimates indicate that the estimated effects of checkpoints surrounding the school are not statistically different for traversing and non-traversing students. There are several reasons why the exam scores of both traversing and non-traversing students are adversely impacted by barriers surrounding the school. First, although it seems likely that students who study and live in the same locality are on average less likely to encounter checkpoints than those who live and study in different localities, it is probable that non-traversing students also encounter checkpoints within localities, especially if there are numerous Israeli settlers residing in these localities. Second, as discussed in Section 2, checkpoints may lead to school-level disruptions (e.g. teacher absenteeism) that would affect all students in the school regardless of where they live.

Table D.1 in Appendix D.1 investigates the impact of other barriers within 10 km of the school (e.g. roadblock, earthmounds, gates). Panel A shows that these other barrier types do not appear to have a detrimental impact on educational performance in the way that checkpoints do, except for English test scores which see a reduction of 0.040 standard deviations when there is one or more other barrier types within the school vicinity. Panel B shows that the estimated impact of fatalities occurring before the exam is similar in magnitude to the impact discussed earlier when the main barrier measure used was checkpoints, suggesting that fatalities do not proxy well for the presence of checkpoints when checkpoints are omitted. There are several reasons why other barriers do not have a negative impact on educational performance in the way that checkpoints do. First, these additional barriers are unlikely to add to the travel time of the student if he or she is commuting by foot since pedestrians can cross over these other barriers. Second, these other types of barriers are less likely to be manned by security forces, cushioning the impact that encounters with security forces may have on the psychological wellbeing of students.

Table 4 present estimates from the barrier matrix specification which aims to investigate the effect of encountering a checkpoint on the road to school. Panel A presents the estimated impact of encountering at least one checkpoint (β^{bm}) from equation (2) while panel B presents the estimated impact of conflict-related violence in the school and home locality (γ_l^{bm} and γ_h^{bm} respectively). Column (1) indicates that encountering at least one checkpoint on the road to school reduces the probability of passing the exam by 3.05 pp, relative to a baseline of 73% (a 4.2% reduction). An additional fatality in the school locality in the twelve months before the exam reduces the probability of passing by 0.07 pp. In contrast, the fatality rate in the student's home locality does not appear to have an adverse impact on academic performance.

Table 4: Impact of encountering one or more checkpoints

	Pass	**Overall score**	**Maths**	**English**
	(1)	(2)	(3)	(4)
A. Mobility restrictions				
Encounters checkpoint	-0.0305***	-0.0714***	-0.0727***	-0.0529***
	(0.0091)	(0.0188)	(0.0199)	(0.0176)
B. Other conflict variables				
Fatalities in school locality	-0.0007***	-0.0012**	-0.0017*	-0.0010**
	(0.0002)	(0.0005)	(0.0009)	(0.0004)
Fatalities in home locality	0.0001	0.0005	0.0010	0.0005
	(0.0002)	(0.0004)	(0.0007)	(0.0004)
Mean of dep. var.	0.73	64.19	63.37	57.79
SD of dep. var.	0.44	20.79	25.88	22.55
Student controls	Y	Y	Y	Y
School controls	Y	Y	Y	Y
Home locality FE	Y	Y	Y	Y
School locality FE	Y	Y	Y	Y
Adj. R-squared	0.107	0.256	0.165	0.327
Observations	146,942	146,942	146,268	146,942

Notes: This table presents estimated coefficients from equation (2). Scores expressed in standard deviations. Mean and standard deviation of untransformed dependent variables (e.g. exam scores) presented in the first two rows. All regressions include the following controls: population size of Israeli settlements within 10 km of school locality (in 1000s), student controls (gender, religion, year of birth, study branch) and school controls (number of classrooms, total number of students, total number of teachers, gender of school). All regressions include the following fixed effects: home locality, school locality, distance bins, and year fixed effects. Standard errors in parentheses, clustered at the home-school locality pair level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Column (2) shows that encountering at least one checkpoint on the road to school reduces the overall TGE score by 0.071 standard deviations. This is equivalent to a 1.48 pp (0.071×20.79) decrease in the overall score, relative to a mean score of 64.19% (a 2.31% decrease). Panel B shows that an additional fatality in the school locality reduces overall TGE scores by 0.001 standard deviations whereas fatalities occurring in the student home locality have no impact on school performance.

Panel A of columns (3) and (4) shows that although encountering at least one checkpoint on the road to school adversely impacts performance in both Maths and English exams, Maths exam scores are particularly negatively impacted. Encountering at least one checkpoint on the road to school reduces Maths and English exam scores by 0.073 and 0.053 standard deviations respectively. Panel B shows that an additional fatality in the school locality also has a detrimental impact on both Maths and English scores. Fatalities occurring in the home locality have no impact on Maths or English scores.

It is worth noting that the estimates of β^{bm} from the barrier matrix specification (Table 4) are larger than the estimates of β^{ws} from the within-school specification (Table 2). For example, the results indicate that the introduction of one or more checkpoints surrounding the school reduces the probability of passing by 1 pp while the barrier matrix estimates indicate that encountering a checkpoint on the way to school reduces the probability by over 3 pp. Similarly, the within school specification suggests that the introduction of one or more checkpoints surrounding the school reduces overall scores by 0.035 standard deviations while the barrier matrix specification indicates that encountering a checkpoint on the road to school reduces the overall score by 0.071 standard deviations. One explanation for this is that the effect of encountering a checkpoint is more direct and therefore more profound than the effect of checkpoints surrounding a school. In particular, encountering a checkpoint may have impacts at the individual level (time delays, psychological effects) while the presence of checkpoints within a vicinity might be dispersed at the school level (disruptions to school schedules). Similar to the findings of the *within-school specification*, we also find that encountering other barriers (e.g. roadblocks) do not have significant negative effects on academic performance (Table D.3 in Appendix D.1).

Overall, the results indicate that mobility restrictions are quantitatively important for educational performance. According to our two complementary specifications, exposure to checkpoints reduces the probability of passing by 1.14pp–3.05 pp and overall exam scores by 0.037–0.071 standard deviations. These effects are comparable to the impacts of violence on educational performance found in the existing literature. For example, Monteiro and Rocha (2017) find that exposure to violence triggered by drug gangs in Brazil reduces Maths test scores by 0.054 standard deviations.[39] Shany (2016) finds that an increase of one Israeli fatality in the student's area within five days before the exam leads to a 0.006 standard deviation decline in exam scores.

Furthermore, the estimated impacts of mobility restrictions are also comparable in magnitude to the impacts of other inputs into the education production function examined in the existing literature. For example, the effect of exposure to barriers is equivalent to one-half to two-thirds of the drop in test scores associated with a one standard deviation decrease in teacher quality in the US (Rivkin et al., 2005; Rockoff, 2004).[40] The effect of exposure to barriers is almost equivalent to a two standard deviation reduction in school management quality (as measured by superintendent value added) in Israel (Lavy and Boiko, 2017).[41] The impact of removing checkpoints is comparable to the impact of mothers in India attending a training program that teaches literacy, numeracy, and engagement in their children's education on their children's Maths test scores (Banerji et al., 2017).[42]

5.2 Threats to Identification and Robustness Checks

5.2.1 Robustness checks: Within school specification

An important condition for the OLS estimate of β^{ws} in our within school estimate to capture the effect of the introduction of checkpoints within 10 km of the school vicinity is that there are no time-varying unobservable student, school, or locality characteristics that are

[39] The authors find that English scores are not affected.

[40] Rivkin et al. (2005) find that a one standard deviation increase in average teacher quality for a grade raises average student achievement in the grade by at least 0.11 standard deviations of the total test score distribution in Maths and 0.095 standard deviations in Reading. Rockoff (2004) finds that a one standard deviation increase in teacher quality raises both reading and math test scores by about 0.1 standard deviations on the national scale.

[41] The authors find that a one standard deviation improvement in superintendent value added increases test scores by about 0.04 standard deviations in the test score distribution.

[42] In this experiment mothers receiving this training increased their child's Maths score by 0.056 standard deviations.

correlated with conflict exposure and exam performance. Student characteristics and composition may change in unobservable ways if there is sample selection of students sitting the TGE or if students move endogenously in order to avoid conflict exposure. Appendix D.2 provides evidence that our results are unlikely to be driven by these two sources of changes in student characteristics (Table D.6). This appendix also provides evidence that these results are unlikely to be driven by reverse causality (Table D.7).

To check whether other time-varying locality-level variables may be driving our results, Table D.2 augments the vector P with additional locality-level variables that may be correlated with the intensity of conflict at the locality area. In addition to controlling for the number of fatalities, we include measures of the number of prisoners held in Israeli jails for security reasons, the number of house demolitions in the school locality, and the length of the separation wall running through that locality (in km). When these additional controls are included, the β^{ws} and γ^{ws} estimates both remain very stable, suggesting that these original conflict measures are not capturing these additional variables when they are omitted. Furthermore, none of these additional variables appear to have a significant effect on exam performance. One exception is that each additional 100 political prisoners at the locality level reduces performance in Maths exams by 0.001 standard deviations.

5.2.2 Robustness checks: Barrier matrix specification

Time-varying locality characteristics. An important condition for the OLS estimates of β^{bm}, γ_l^{bm} and γ_h^{bm} in equation (2) to identify the causal impacts of exposure to conflict is that the school or home locality variables that affect exam performance and are correlated with exposure to conflict are time-invariant. To check whether omitted time-varying locality characteristics are driving our main results, we allow the home and school locality fixed effects of equation (2) to take on different values for each academic year.[43] Although this strategy helps control non-parametrically for unobservable time-varying characteristics at

[43]In particular, we interact each locality fixed effect with a set of academic year fixed effects.

both the home and school locality, we cannot estimate the impact of other time-varying observable locality variables (e.g fatalities) that are now collinear with the time-varying locality effects. Therefore, in specifications with academic-year specific locality fixed effects, we omit all other time-varying locality characteristics from the regression. When these year-specific home and school locality fixed effects are included, the coefficients are identified by variation within home (school) locality across students attending schools (living) in different localities. Results for these models are presented in the odd columns of Table 5. In the even columns, we include school fixed effects in addition to time-varying home and locality fixed effects.

The estimates in the table are very similar to those in the baseline specification. Column (1) shows that the estimated impact of encountering at least one checkpoint on the probability of passing when time-varying home and school locality fixed effects are included is -2.79 pp (vs -3.05 pp in the baseline specification). When school fixed effects are included in addition to time-varying home and school locality fixed effects, the estimates are slightly smaller but similar to the baseline estimates (-2.49 pp in column 2). The remaining columns of Table 5 perform the same exercise using exam scores as the outcome variable. The estimates are very similar to those in the baseline specification. Overall, these results suggest that time-varying unobservables at the locality level are unlikely to be a major confounding factor.

Home-by-school locality fixed effects. The baseline specification uses additive home and school locality fixed effects, potentially restricting the way in which unobservable time-invariant home and school characteristics can affect educational outcomes. The odd columns of Table D.4 present estimates from versions of equation (2) that include home-school locality pair fixed effects rather than additive home and school locality fixed effects, absorbing the distance bin dummies. In this alternative specification, identification comes from comparing changes in outcomes of students commuting on routes that saw an introduction of at least one checkpoint with changes in outcomes of students commuting on routes that did not. In the even columns, the estimates are from models that include both home-school locality pair fixed effects and school fixed effects.

When these alternative fixed effects are used, the estimated coefficients are almost identical to those in the baseline specification with additive home and school locality fixed effects. For example, when home-school locality pair fixed effects are included, the estimated coefficient on the E_{hlt} variable is -3.08 pp (vs -3.05 with additive fixed effects) for the probability of passing and -0.0764 standard deviations (vs -0.072) for the overall exam score. When school fixed effects are included in addition to home-school locality pair fixed effects, the estimates are slightly smaller in magnitude but still remain very stable (e.g. -3.04 pp in column 2).

Multiway clustering. The standard errors of our baseline estimates are clustered at the home-school locality pair level. Although this allows for errors to be correlated by home locality and school locality pairs, it does not allow for possible two-way error correlation across both the home and school locality in the pair. Table D.5 estimates equation (2) and clusters standard errors at both the home locality and school locality level. The standard errors presented in this table are very similar to those in the baseline specification.

Table 5: Impact of encountering checkpoints (inc. academic-year specific fixed effects)

	Pass		**Overall score**		**Maths**		**English**	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. Mobility restrictions								
Encounters checkpoint	-0.0279***	-0.0249***	-0.0818***	-0.0701***	-0.0794***	-0.0669***	-0.0680***	-0.0608***
	(0.0092)	(0.0087)	(0.0193)	(0.0180)	(0.0206)	(0.0191)	(0.0191)	(0.0180)
B. Other conflict variables								
Fatalities in school locality	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–
Fatalities in home locality	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–
Mean of dep. var.	0.73		64.19		63.37		57.79	
SD of dep. var.	0.44		20.79		25.88		22.55	
Home local × Year FE	Y	Y	Y	Y	Y	Y	Y	Y
School local × Year FE	Y	Y	Y	Y	Y	Y	Y	Y
School FE		Y		Y		Y		Y
Adj. R-squared	0.115	0.129	0.266	0.288	0.179	0.202	0.338	0.357
Observations	146,942	146,942	146,942	146,942	146,268	146,268	146,942	146,942

Notes: This table presents estimated coefficients from equation (2) where time-invariant home and school locality fixed effects are replaced with academic-year specific home and school locality fixed effects. Scores expressed in standard deviations. The remaining controls (student and school) and fixed effects (distance bins and year) are the same as in the baseline regression. Standard errors in parentheses, clustered at the home-school locality pair level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

6 Mechanisms

This section explores several mechanisms driving the negative relationship between mobility restrictions and academic performance documented in the earlier sections.

6.1 Impact via School-learning Environment

The negative coefficients on the number of checkpoints within 10 km of the school locality in the within-school specification suggests that factors that impact school-level variables may be important in this context. The restricted movement of goods and people over this period may impact the number of personnel and physical resources available at school, both of which may be important inputs into academic performance. To examine this mechanism, we estimate school-level versions of the within-school specification (equation 1) by combining the schools data and conflict data. We use the number of teachers and the number of employees (excluding teachers) to measure the availability of personnel. We use the availability of a science lab and a computer lab to capture physical infrastructure, measures commonly used in the existing literature (Monteiro and Rocha, 2017). We also replace the vector X_{it} with the proportion of students within a given school taking the Science stream since this is likely to affect the presence of some facilities (e.g. science labs).

These results are presented in Table 6. Columns (1) and (2) examine the impact of conflict on the availability of personnel within schools. Panel A of column (1) provides some evidence that the introduction of at least one checkpoint within 10 km of the school locality centre leads to a 1.4% decrease in the number of teachers (0.272/19.62), significant at the 10% level. Column (2) shows that there is no evidence that the introduction of checkpoints affects the number of employees within school. Panel B of columns (1) and (2) indicate that changes in the number of fatalities in the school locality do not affect the number of teachers or employees within the school. This is consistent with the checkpoint measure capturing the impact of restricted mobility of people, rather than other unobservable time-varying school characteristics such as financial constraints that may also affect the school's ability to recruit staff.

Since the number of teachers and employees is only a crude proxy for the labour input into the production function, there are some shortcomings of this analysis. First, the number of teachers and employees refers to the personnel on the school's payroll in an academic year. It is possible that even though these personnel appear on the payroll, they are absent for parts of the school year due to exposure to conflict. Unfortunately, we do not observe individual-level or school-level teacher absenteeism rates which have been shown to be important in the existing literature. Second, since students are likely to be taught by a subset of teachers within the school, a more refined analysis might match students with the teachers who instruct them and examine how those particular teachers' encounters with checkpoints affect their students' performance. This is beyond the scope of this paper due to data limitations.

Columns (3) and (4) examine the impact of conflict on the physical resources within schools. Column (3) provides some evidence that the introduction of checkpoints within 10 km of the school locality reduces the availability of science labs by 5.6 pp, relative to a baseline of 71% of schools having a science lab (a 7.8% decrease). In contrast, column (4) suggests that the introduction of checkpoints within 10 km of the school locality centre does not have an impact on the availability of computer labs in school. These results hold when we restrict the sample to schools that are present throughout the entire sample (57% of the overall sample of schools), suggesting that these findings are not driven by the changes in resources of new schools entering during this period. Descriptive statistics from the schools data suggest that these effects are temporary: among schools that report losing a science lab in a given year, 58.47% report in the follow year that these facilities are available.

Panel B of columns (3) and (4) shows that fatalities in the school locality do not have a negative impact on any of the two measures of the physical environment of the school. This confirms the idea that the checkpoint measure captures the restricted mobility of goods. If the conflict variables were merely capturing unobservable time-varying school characteristics such as financial constraints, it is likely that this would also be reflected in the fatalities measures.

Table 6: Mechanisms – Impact of conflict on school environment

	Num teachers	**Num employees**	**Science lab**	**Computer lab**
	(1)	(2)	(3)	(4)
A. Mobility restrictions				
$\geq$ 1 CP within 10km	-0.2718*	0.0341	-0.0556*	-0.0293
	(0.1591)	(0.0489)	(0.0305)	(0.0238)
B. Other conflict variables				
Fatalities in school locality	0.0333	-0.0003	0.0003	0.0013
	(0.0224)	(0.0028)	(0.0008)	(0.0012)
Mean of dep. var.	19.62	0.46	0.71	0.73
SD of dep. var.	5.92	1.24	0.45	0.44
School controls	Y	Y	Y	Y
School FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Adj. R-Squared	0.894	0.518	0.272	0.298
Num. of schools	543	543	543	543
Observations	2,886	2,779	2,434	2,779

Notes: All regressions include the following controls: population size of Israeli settlements within 10 km of school locality (in 1000s), school controls (number of classrooms, total number of students), the proportion of students in the school taking the science stream. Standard errors in parentheses, clustered at the school locality level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

6.2 Impact via Psychological Well-being

The presence of checkpoints or encounters with security personnel at these checkpoints may affect the psychological wellbeing of students. Since the exam scores data do not contain information on psychological wellbeing, to examine whether exposure to conflict has a negative impact on the wellbeing of students, we supplement our analysis with the Survey on the Impact of the Israeli Measures on the Well-being of the Palestinian Children, Women and the Palestinian Household (henceforth, *wellbeing survey*) conducted by the PCBS. The survey sample consists of over 2,000 representative households in the West Bank.[44] The survey

[44]More details on the survey can be found in B.3.

primarily focuses on pre-secondary school age children; thus, the student sample covered by the well-being survey are younger than those in the exam scores data. We focus on students between 13 and 17 years old who are in school.[45]

The survey questions that we use can be categorized into three domains. First, the survey provides information about the locality of residence of the household. This allows us to match measures of conflict to the student home locality. Second, the survey asks questions that allow us to control for individual characteristics that might be correlated with psychological well-being and exposure to conflict. Third, the survey contains several questions pertaining to the psychological well-being of students.

To measure psychological well-being, we focus on three questions asked to children or their caregiver, respectively capturing cognitive, emotional, and behavioural problems. The cognitive question asks whether the child suffers from a "lack of ability to concentrate" in the half year before the survey.[46] The emotional question asks whether the student suffers from "feelings of hopelessness and frustration" or "anger and nervous breakdown".[47] The behavioural question asks whether the child has tendencies of "violence", "screaming" or to "beat/imprecate others".[48] We use these questions to construct indicators for the presence of cognitive, emotional, and behavioural problems.

Despite the detailed questions this survey contains, there are some shortcomings of this data. First, it is only available for one year and therefore we cannot use the fixed effects strategy used previously. Our empirical strategy involves conditioning on a rich set of controls at the individual and locality level. Second, the survey does not contain information about the school locality of the student. Therefore, we are unable to estimate regression analogous to the barrier matrix specification.

[45] 98.92% of children within this age group report being enrolled in school.

[46] The survey question is: "Does X suffer from a lack of concentration?"

[47] The survey question is: "Which of the following psychological/emotional problems suffered by X? (a) Feelings of hopelessness and frustration, (b) Anger and nervous breakdown, (c) None of the above."

[48] The survey question is: "Which of the following behavioural problems suffered by X? (a) Tendency to violence, (b) Tendency to screaming, (c) Tendency to beat/imprecate others, (d) None of the above."

We estimate the following cross-sectional regression for student i living in home locality h:

$$y_{ih} = \alpha + \beta^{psych} B_h + F_h \gamma^{psych} + P_h' \eta + X_{ih}' \zeta_1 + \epsilon_{ih} \tag{3}$$

where the dependent variable y_{ih} consists of binary indicators for cognitive, emotional, and behavioural problems. Similar to the within-school specification, B_h is an indicator variable that equals one if there are one or more checkpoints within 10 km of the home locality centre in the (calendar) year before the survey. The variable F_h measures the number of fatalities in home locality h in the 12 months before the survey.[49] The vector P_h' consists of the extended list of lagged policy-relevant variables (settler population size within 10 km of locality h, number of Palestinian prisoners in locality h, the number of house demolitions, and the length of the separation wall going through locality h). The vector X_{ih}' includes a set of individual characteristics. The extended list includes age, gender, household income (in Israeli Shekels) and the educational attainment of the household head.

Table 7 presents estimates of β^{psych} and γ^{psych} from equation (3). In this sample, the baseline rates of reported concentration, emotional, and behavioural problems are high: 45%, 60%, and 28% of students respectively report experiencing these problems. Column (1) shows that the presence of one or more checkpoints within 10 km of the home locality centre increases the probability of suffering from a lack of concentration by 5.5 pp. When additional controls are included in column (2), this estimate remains fairly stable at 5.9 pp, suggesting that this finding is unlikely to be driven by selection based on observable characteristics. Columns (3) and (4) indicate that the presence of one or more checkpoints within 10 km of the home locality centre does not have an impact on the probability of experiencing feelings of hopelessness or frustration. Column (5) suggests that the presence of at least one checkpoint within 10 km of the home locality increases the probability of violent behaviour among students by over 13 pp. Column (6) shows that these estimates are

[49] Since the survey took place in April to May 2001, this variable consists of fatalities from April 2000 to March 2001.

stable when additional variables are included.

Panel B examines the impact of exposure to fatalities on psychological well-being. Column (1) indicates that each additional fatality occurring in the 12 months period prior to the survey increases the probability of students suffering from a lack of concentration by 1.3 pp. When additional controls are included, the estimated impact of an additional fatality is very similar. Columns (3) and (4) suggest that fatalities occurring in the 12-month period prior do not have a detectable impact on the probability of students reporting feelings of hopelessness or anger. Lastly, columns (5) and (6) provide evidence that each additional fatality occurring in the 12 month period prior to the survey month increase the probability of violent behaviour by 1 pp.

Table 7: Mechanisms – Impact of conflict on psychological wellbeing

	Cognitive (Lack of concentration)		**Emotional** (Hopeless/Anger)		**Behaviour** (Violent acts)	
	(1)	(2)	(3)	(4)	(5)	(6)
A. Mobility restrictions						
$\geq$ 1 CP within 10km	0.0546*	0.0589**	0.0350	0.0277	0.1354***	0.1329***
	(0.0295)	(0.0300)	(0.0289)	(0.0296)	(0.0263)	(0.0266)
B. Other conflict variables						
Fatalities in school locality	0.0131***	0.0140***	0.0060*	0.0085**	0.0107***	0.0109***
	(0.0033)	(0.0038)	(0.0031)	(0.0035)	(0.0030)	(0.0035)
Mean of dep. var.	0.451		0.602		0.275	
SD of dep. var.	0.498		0.490		0.447	
Basic student controls	Y	Y	Y	Y	Y	Y
Additional student controls		Y		Y		Y
Other conflict variables	Y	Y	Y	Y	Y	Y
Adj. R-Squared	0.03	0.03	0.01	0.01	0.05	0.06
Observations	1,373	1,368	1,373	1,368	1,373	1,368

Notes: This table presents estimated coefficients of equation (3). Sample includes students aged 13–17 living in the West Bank enrolled in school. Data source: Palestinian wellbeing survey All regression control for population size of Israeli settlements within 10 km of home locality (in 1000s). Basic student controls include gender and age. Additional student controls include: household income and educational attainment of household head. Other conflict variables include: number of political prisoners in the home locality (in 100s), number of house demolition in the home locality, length of the separation wall running through the locality (km). Robust standard errors in parentheses. Data source: wellbeing survey. Standard errors in parentheses, clustered at the school locality level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Overall, these results lend support to the hypothesis that one potential reason for the negative impact of mobility restrictions on educational performance is the detrimental impact mobility restrictions have on the psychological well-being of students, which may in turn influence their ability to perform well in school. The cross-sectional nature of the survey data leads us to be more cautious about ascribing a causal interpretation to these findings. However, the fact that the estimated effects are stable when an extensive list of student, household, and locality characteristics is included somewhat alleviates the concern that these results are driven by students who are more prone to psychological problems being more likely to be exposed to conflict.

6.3 Impact via Time Loss

Students who cross checkpoints on the road to school lose time in the morning and early evening, reducing their study time. The unpredictability of delays could also be costly as students either have to leave home early enough to allow for long delays or risk missing part of the school day. To investigate the role of delays, we modify our barrier matrix specification and estimate the following regression using the exam scores data and newly collected delay factor described in Section 3:

$$\begin{aligned} y_{ihlt} &= \alpha + \beta_1^{tl} Delay_{hlt} + \beta_2^{tl} \#Checkpoints_{hlt} + D'_{hl}\delta + \rho_h + \sigma_l + \tau_t \\ &\quad + F_{l,t-1}\gamma_l^{tl} + F_{h,t-1}\gamma_h^{tl} + P_{l,t-1}\eta_l + P_{h,t-1}\eta_h + X'_{it}\zeta_1 + W'_{st}\zeta_2 + \epsilon_{ihlt} \end{aligned} \tag{4}$$

Equation (4) modifies baseline equation (2) in two ways: (a) it replaces the binary E_{hlt} variable by the count $\#Checkpoints$ variable and (b) it augments the baseline equation with the $Delay$ variable, which captures the delay factor (in minutes) incurred due to checkpoints encountered along the shortest route from h to l in year t. We use the number of checkpoints rather than a binary cross checkpoint indicator to ensure that the delay variable is not purely capturing the number of checkpoints encountered since those who encounter more checkpoints are likely to face longer aggregate delays. We include both a count of the number of checkpoints and the delay variable to examine whether the delay variable contains additional information on top of the number of checkpoints (which might capture factors such as psychological effects). Since there is variation across checkpoints in the delay time incurred, the effects of delay time and an additional checkpoint encountered can be separately identified. The remaining variables are as described before.

The odd columns of Table 8 first establish that the variable *#Checkpoints* affects exam performance by estimating equation (4) without the *Delay* variable. The estimated coefficients in the odd columns of panel A are negative and statistically significant for all four outcomes. The even columns present results for regressions that also include the *Delay* variable.

In column (2), the β_1^{tl} estimate suggests that conditional on the number of checkpoints encountered and on the distance travelled from home to school, each additional minute delayed at checkpoints reduces the probability of passing the TGE by 0.11 pp. Existing literature suggests that over this period delay times at checkpoints were typically at least 15 minutes (Eklund, 2010; Eklund and Martensson, 2012). Therefore, this estimate suggests that being delayed at one or more checkpoints reduces the probability of passing by at least 1.65 pp (0.11×15). This is a non-trivial component of the overall effect of encountering at least one checkpoint (a reduction of 3.05 pp in the probability of passing). The β_2^{tl} estimate indicates that each additional checkpoint reduces the probability of passing the TGE by 1.08 pp, similar to the estimate in column (1). This suggests the checkpoint count measure and the constructed delay times are not strongly correlated with each other, after partialing out all the other explanatory variables and fixed effects included in equation (4). Panel B presents the γ_l^{tl} and γ_h^{tl} coefficients and shows that an additional fatality at the school locality reduces the probability of passing the TGE by 0.07 pp whereas fatalities at the home locality do not have an impact on educational performance.

The estimates in column (4) also indicate that delays at checkpoints may be an important reason why mobility restrictions have a negative impact on overall TGE scores. Panel A shows that each additional minute of delay at checkpoints reduces the overall TGE score by 0.0022 standard deviations. Evaluated at an average delay of 15 minutes, this suggests that the time delay mechanism can account for a 0.033 standard deviation decrease in overall TGE scores. This calculation is roughly half the estimated impact of encountering at least one checkpoint on overall TGE scores in Table 4 (-0.071 standard deviations). Panel B of this column indicates that additional fatalities at the school locality have a strong negative impact on the overall score.

Columns (6) and (8) explore the impact of delays on Maths and English scores. Column (6) shows that although an additional checkpoint encountered has a strong negative impact on Maths scores (-0.033 standard deviations), the coefficient on the *Delay* variable is negative but statistically insignificant. Column (8) suggests that each additional minute delayed at a checkpoint reduces English scores by 0.0027 standard deviations. Evaluated at an average delay time of 15 minutes per checkpoint, this suggests that being delayed at a checkpoint reduces English scores by 0.041 standard deviations, almost 80% of the baseline effect. When the *Delay* variable is included, the coefficient on the total number of checkpoints encountered becomes statistically insignificant. Panel B of these two columns shows that the estimated impact of an additional fatality in the home or school locality remains very similar to the estimates in the baseline specification.

Overall, the estimated coefficient on the *Delay* variable in equation (4) establishes that delays at checkpoints contains information over and above the measure of the number of checkpoints encountered and the distance travelled from home to school. These results therefore support the hypothesis that one reason why physical barriers in the form of checkpoints worsen academic performance is that students lose time when travelling to and from school, reducing the time available to study.

Table 8: Mechanisms – Time loss due to mobility restrictions

	Pass		Overall score		Maths		English	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. Mobility restrictions								
Total number of CP	-0.0120**	-0.0108**	-0.0311***	-0.0285***	-0.0345***	-0.0326***	-0.0167*	-0.0136
	(0.0052)	(0.0052)	(0.0109)	(0.0109)	(0.0115)	(0.0115)	(0.0099)	(0.0100)
Delay factor (mins)		-0.0011**		-0.0022*		-0.0016		-0.0027**
		(0.0005)		(0.0011)		(0.0012)		(0.0011)
B. Other conflict variables								
Fatalities in school locality	-0.0007***	-0.0007***	-0.0012**	-0.0012**	-0.0017*	-0.0017*	-0.0010**	-0.0010**
	(0.0002)	(0.0002)	(0.0005)	(0.0005)	(0.0009)	(0.0009)	(0.0004)	(0.0004)
Fatalities in home locality	0.0001	0.0001	0.0004	0.0004	0.0009	0.0009	0.0005	0.0005
	(0.0002)	(0.0002)	(0.0004)	(0.0004)	(0.0007)	(0.0007)	(0.0004)	(0.0004)
Mean of dep. var.	0.73		64.19		63.37		57.79	
SD of dep. var.	0.44		20.79		25.88		22.55	
Student controls	Y	Y	Y	Y	Y	Y	Y	Y
School controls	Y	Y	Y	Y	Y	Y	Y	Y
Home locality FE	Y	Y	Y	Y	Y	Y	Y	Y
School locality FE	Y	Y	Y	Y	Y	Y	Y	Y
Adj. R-Squared	0.107	0.107	0.255	0.255	0.165	0.165	0.327	0.327
Observations	146,942	146,942	146,942	146,942	146,268	146,268	146,942	146,942

Notes: This table presents estimates from Equation (4). Scores expressed in standard deviations. The remaining controls (student and school) and fixed effects (home locality, school locality, distance bins and year) are the same as in the baseline regression. Standard errors in parentheses, clustered at the home-school locality pair level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

7 Conclusion

A prominent feature of contested regions are conflict infrastructures such as walls and checkpoints (Pullan et al., 2012). These infrastructures restrict mobility and affect the daily routine of those living nearby. This paper studies the impact of physical barriers and resulting mobility restrictions on the educational performance of high school students in the the West Bank between 2000 and 2006.

We find evidence that mobility restrictions in the form of checkpoints have adverse impacts on educational performance. The introduction of at least one checkpoint within 10 km of the center of the school locality reduces the probability of passing the TGE by over 1 percentage point (pp) and the overall exam score by 0.037 standard deviations. Encountering one or more checkpoints on the road to school reduces the probability of passing the final exam by 3.05 pp and overall exam score by 0.071 standard deviations. The impacts of mobility restrictions operate through a distinct channel to conflict-related violence which has been the focus of the previous literature. An additional fatality in the school locality reduces the probability of passing by 0.07 pp and the overall exam score by 0.001 standard deviations. The effects of mobility restrictions are particularly detrimental to Maths scores.

We find evidence of three mechanisms at play. First, checkpoints surrounding a school weakly reduces the number of teachers in the school and the probability that the school has a science lab. Second, mobility restrictions significantly increase the probability of students suffering from a lack of concentration and increase the tendency of violent behaviour. Third, each additional minute travelled reduces the probability of passing the exam by 0.11 pp.

Given the importance of educational performance for future labour market prospects and for aggregate human capital accumulation, understanding the relationship between the various facets of conflict and educational outcomes is valuable. Furthermore, understanding the mechanisms through which conflict affects educational outcomes will help in the planning of educational policies.

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A Background Appendix

A.1 Evolution of Conflict over time in the West Bank

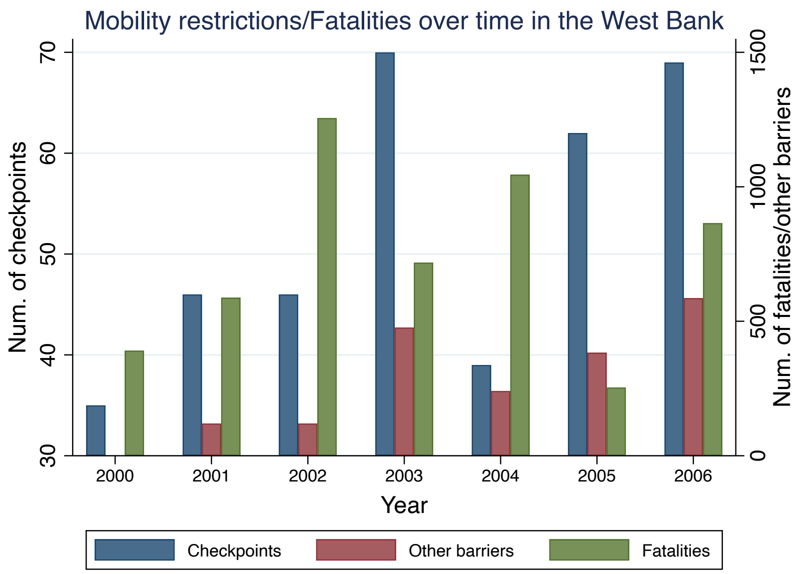

Figure A.1: This figure shows the number of checkpoints, other physical barriers, and fatalities over time. Other physical barriers include roadblocks, earth mounds, and gates.Fatalities refer to Palestinian fatalities. *Source:* Applied Research Institute of Jerusalem (ARIJ) for barriers data; The Israeli Information Center for Human Rights in the Occupied Territories (B'Tselem) for fatalities data.

A.2 Study Streams and Exam Scores

As discussed in Section 2 of the main paper, the subjects and exam scores in the TGE varies across study streams. Table A.1 illustrates how the exam subjects differ by study stream. For example, the exam subjects of Arts students are: Islamic education (maximum grade 100), Arabic (300), English (280), History (120), Mathematics (100), Geography (100), and Scientific culture (100). The total score is calculated by summing the grades for the following subjects: Arabic, English, History, Mathematics and the highest two grades between two of the remaining subjects (Geography, Islamic education and Scientific culture). The total maximum exam score is 1000. For Science students, the subjects and the maximum grade are as follows: Islamic education (100), Arabic (200), English (200), Mathematics (240), Physics (160), Chemistry (100) and Biology (100). The total score is calculated by summing the grades for the following subjects: Arabic, English, Mathematics, Physics, and the highest score of any other two subjects (Islamic education, Chemistry, Biology). Although only two of the remaining optional subjects contribute to the final score, the student must pass each individual subject in order to pass the TGE.

Table A.1: Calculation of total score by stream of study

Stream of study (1)	**Subjects examined** (2)	**Max score** (3)	**Part of final score** (4)
Art	Islamic education	100	
(*Adabi*)	Arabic	300	Yes
	English	280	Yes
	History	120	Yes
	Mathematics	100	Yes
	Geography	100	
	Scientific culture	100	
Science	Islamic education	100	
(*Elmi*)	Arabic	200	Yes
	English	200	Yes
	Mathematics	240	Yes
	Physics	160	Yes
	Chemistry	100	
	Biology	100	
Commerce	Islamic education	100	
(*Tejari*)	Arabic	100	Yes
	English	100	Yes
	Mathematics	100	
	Accounting	150	Yes
	Administration	150	Yes
	Economics	100	
	Finance	100	Yes
	Finacial application	100	Yes
	Practical training	100	Yes
Agriculture	Islamic education	100	
(*Zera'i*)	Arabic	100	Yes
	English	100	Yes
	Farm management	100	Yes
	Chemistry	100	
	Biology	100	
	General agricultural sciences	100	Yes
	Private agricultural sciences	200	Yes
	Practical training	200	Yes
Manufacturing	Islamic education	100	
(*sena'i*)	Arabic	100	Yes
	English	100	Yes
	Mathematics	100	
	Physics	100	
	Industrial drawing	200	Yes
	Industry science	200	Yes
	Practical training	200	Yes

Notes: This table describes the list of study streams for students in the data. Within each stream (column 1), students sit exams for each subject in column (2). The maximum score for each subject depends on the stream (column 3). The overall score for students in that stream by summing the scores of the compulsory subjects (denoted by "yes" in column 4) and the highest two grades of the remaining two subjects.

B Data Appendix

B.1 Summary of data sources

The main data sources in our study include:

- **Education data**: This provides information on student exam scores from 2000–2006. We link this data to information on schools. This forms the basis of our analysis.

  Our main sample focuses on state school students between 17 and 19 years old who take the TGE. We restrict our sample to state-school students for two reasons. First, the majority of West Bank students (roughly 75% in our sample) attend state schools and therefore they are the most representative student group. Second, many students attending private schools in fact enrol to sit for the TGE via "private-study" centres. Details of these private-study centres are not consistently collected by the MoEHE. We restrict our sample to students between 17 and 19 years old to limit the likelihood of having repeated test takers in our sample.

- **Mobility restrictions data**: The GIS data on the location of barriers over time is used to construct measures of the barriers within 10 km away from the school locality centroid and the barrier matrix. We match year t measures of mobility restrictions to year t education data.

- **Fatalities data**: This provides information on the number of fatalities per month in each locality. Lagged measures of fatalities (12 months prior to the exam) are matched to the test score data.

- **Wellbeing survey**: This is a survey on cognitive, emotional, and behavioural problems experienced by students in the West Bank. We use this to examine the impact of mobility restrictions on wellbeing. More details can be found below.

In our regressions, we control for the population size of Israeli settlements within 10 km of school or home locality. Due to the cross-sectional nature of the *wellbeing data*, we include additional controls in equation (3) of the main paper: the number of prisoners (in 100s) in each locality, the number of house demolitions in each locality, and the length of the separation wall (in km) going through the locality. Details on these data sources are as follow:

- **Settlements data**: This contains information on the location of Israeli settlements in the West Bank and its population size. Physical proximity between Israeli settlements and Palestinian localities may affect political attitudes and the intensity of conflict (Calì and Miaari, 2017). Furthermore, since physical barriers tend to be constructed near settlements, Palestinian localities situated near Israeli settlements tend to face more mobility restrictions than those that are located further away. This data allows us to calculate the road distance between the settlement and various Palestinian localities. Using this information, we construct measures of the population size (in 1000s) of Israeli settlements within 10 km of the locality centre.

- **Prisoners data**: This contains information on the number of residents in each locality who are prisoners held in Israeli jails for security reasons in a given year. This data is provided by the Palestinian Ministry of Prisoners.

- **House demolitions**: This data provides information on house demolition orders for each Palestinian locality. Most house demolitions in the West Bank are enforced by the IDF as a counter-insurgency security measure.

- **Separation wall**: This data provides information on the length of the separation wall between Israel and the West Bank. The data is available for every other year; for years with missing data, we use linear interpolation to compute the length of the wall. The length of the separation wall varies over time for localities near the wall. For localities far from the wall, this variable remains at zero.

We also use the following data sources for robustness checks:

- **Palestinian census**: We use the 1997 and 2007 Palestinian census, aggregated to the locality-year level, to understand rates of internal mobility and check for endogenous mobility.

- **Palestinian labour force survey**: This is a representative rotating quarterly household panel survey of Palestinians living in the West Bank and Gaza Strip. Households are surveyed four times over six quarters. The survey collects information on employment, school attendance, years of completed education of household members aged 15 and above. This is used to construct locality-level economic variables (e.g. average hourly wage) and is used in Sections C and D.2 of the Appendix).

B.2 Data on delay factors at checkpoints

We collected data on the delay factors for all major internal and external checkpoints in the West Bank. In January 2017, there were 98 permanent checkpoints in the West Bank: 59 internal checkpoints located well within the West Bank and 39 external checkpoints that serve as the last inspection points before entering Israel.

For the internal checkpoints, 70 public transport drivers selected from across the West Bank collected GPS data on a daily basis between January 2018 and June 2018. Drivers then emailed their smartphone GPS data. Using information on when the car entered the checkpoint and when it exited the checkpoint, we construct the delay times at each internal checkpoint. In particular, we calculate the average time it takes cars to travel from 750 meters before the checkpoint to 750 meters after the checkpoint (a total distance of 1500 meters). We take the average delay for each month and then the average over the 6 months. The GPS data recorded the location of the car, time, and speed every five seconds during the survey period. These cars covered 47 of the 59 existing internal checkpoints. Checkpoints in the district of Hebron were not accessed due to the restrictions on vehicular movement across these checkpoints. The delay time at the remaining internal checkpoints were evaluated by using the closest similar checkpoint.

For the remaining external checkpoints, the GPS method could not be used since Palestinian vehicles are restricted from crossing these checkpoints from the West Bank to Israel. Instead, a random sample of 600 Palestinian labourers and students crossing these checkpoints were interviewed over a course of a week between 4am and 8am (before work). The respondents were asked to provide information on (a) the starting location of the trip, (b) the time she/he began the trip, (c) the arrival time at the checkpoints, (d) the time required to cross the checkpoint, and (e) the time and distance required to reach the destination. 11 external checkpoints were covered, including the two external checkpoints which students in the education data cross (Qalandiya and Gilo 300). At these two checkpoints, the average delay times over our survey period were 81 and 34 minutes respectively.

B.3 Survey data on wellbeing

The *wellbeing survey* used in Section 6 of the main paper is more formally called the "Impact of the Israeli Measures on the Well-being of the Palestinian Children, Women and the Palestinian Household (2001)". The well-being survey was conducted by the Palestinian Central Bureau of Statistics. The target population consists of all Palestinian households that usually reside in the West Bank and Gaza Strip, excluding persons living in institutions such as prisons. We focus on households residing in the West Bank to be consistent with the rest of our data. This section provides some information about the survey.

- Sample size: A random stratified cluster sample composed of 3,393 households of which 2,301 in the West Bank and 1,092 in Gaza Strip was selected to represent the target population. The sample included enumeration areas close to clashes, settlements, and Israeli checkpoints. It also covered areas close to military exposure (shelling, shooting, uprooting of trees, land drifting, etc.)

- Data collection: Data collection took place between April 11 2001 to May 15 2001. Therefore, we define exposure to fatalities at the locality level a year before the survey as fatalities occurring between February 2000 to March 2001.

- Response rate: The number of completed interviews was 90% in the West Bank and 89% in the Gaza Strip.

The questions we use to measure cognitive, psychological, and behavioural problems are as follows:

- Cognitive: Does X suffer from a lack of concentration?

- Emotional: Which of the following psychological/emotional problems suffered by X? (a) Feelings of hopelessness and frustration, (b) Anger and nervous breakdown, (c) None of the above.
- Behavioural: Which of the following behavioural problems suffered by X? (a) Tendency to violence, (b) Tendency to screaming, (c) Tendency to beat/imprecate others, (d) None of the above.

C Additional Descriptive Statistics

C.1 Traversing vs. Non-traversing Students

Table C.1 examines whether traversing and non-traversing students differ on observable dimensions. The summary statistics suggest that traversing and non-traversing students are similar in terms of baseline characteristics and educational outcomes. For example, in both groups, the average age is 18.2 years and the pass rate is 73%.

Table C.1: Summary statistics for traversing vs. non-traversing students

	Do not traverse	**Traverse**	**Difference**
	(1)	(2)	(3)
Age	18.202	18.207	0.005*
Female	0.529	0.506	-0.023***
Muslim	0.992	0.993	0.001*
Art	0.697	0.644	-0.052***
Science	0.244	0.272	0.027***
Vocational	0.059	0.084	0.025***
Pass	0.732	0.735	0.003
Score	63.978	64.629	0.651***
Observations	100,132	46,810	

Notes: Columns (1) and (2) contains variable means for traversing and non-traversing students. Traversing students are those who live and study in different localities. Column (3) presents the difference in means (column 2 minus column 1). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

C.2 School growth

Table 1 in the main paper documents an increase in the number of students and schools over our sample period. The increase in schools partly reflects an attempt to accommodate the larger student population and could be one reason for the decreasing proportion of students who commute to a different locality to attend school across the years.

One concern is that the number of schools and the location of schools responds endogenously to conflict variables. Table C.2 examines the drivers of school numbers by regressing the number of secondary schools in locality l on the following explanatory variables (lagged by one year): secondary-school age population, the presence of checkpoints within 10 km, economic variables (hourly wage, unemployment rate), and the Israeli settler population. The estimates indicate that the main determinant of the number of schools is the secondary-school age population: conditional on locality and year fixed effects, an increase in the population aged 17–19 by 1000 is associated with an increase in the number of secondary schools of 0.26.

Table C.2: Predictors of growth in number of schools within localities

	Dep var: **Number of schools in locality** (1)	(2)
Population aged 17-19 (in 1000s)	1.260***	0.257***
	(0.030)	(0.063)
$\geq$ 1 CP within 10km	0.068	0.068
	(0.066)	(0.048)
Hourly wage	-0.000	-0.000
	(0.003)	(0.002)
Unemployment rate	-0.435*	-0.046
	(0.236)	(0.167)
Israeli settler population (in 1000s)	-0.005***	-0.003
	(0.001)	(0.008)
Year FE	Y	Y
Locality FE		Y
Adj. R-Square	0.632	0.908
Observations	1,011	993

Notes: Regression results for equations examining the determinants of school growth.

C.3 Balance tables

Table C.3 compares variable means for localities that saw over 2 checkpoints introduced over 2000–2006 with variable means for localities that saw one or no checkpoints introduced over 2000–2006.

Table C.3: Means of locality characteristics, by number of CPs introduced

	$\leq$ 1 CP introduced	**$\geq$ 2 CPs introduced**	**Difference**
	(1)	(2)	(3)
A. Labour market outcomes			
% 17-19 y/o in school	0.643	0.617	-0.027
Log hourly wage	2.246	2.286	0.041
Unemployment rate	0.231	0.226	-0.006
% Employed in Israel	0.115	0.106	-0.008
B. Demographic variables			
Male	0.507	0.508	0.001
Married	0.488	0.491	0.003
Years of schooling	8.194	8.401	0.207
Settlement pop size (in 1000s)	6.793	19.495	12.701**
C. Conflict-related variables			
Num. of fatalities	0.332	1.593	1.261*
Num. of prisoners	120.736	356.133	235.397**
Num. other barriers	6.762	11.828	5.065***
Num. house demolitions	0.152	0.361	0.209
Length of separation wall (in km)	0.800	1.215	0.415
Observations	140	136	

Notes: Columns (1) presents variable means for localities that have 1 or fewer checkpoints introduced over 2000-2006. Columns (2) presents variable means for localities that have 2 or more checkpoints introduced over 2000-2006. Column (3) presents difference in means. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

D Additional Results

D.1 Other results and main robustness checks

Table D.1: Impact of other barriers (OBs) near school

	Pass	**Overall score**	**Maths**	**English**
	(1)	(2)	(3)	(4)
A. Mobility restrictions				
$\geq$ 1 OB within 10km	-0.0099	-0.0273	-0.0281	-0.0403**
	(0.0079)	(0.0172)	(0.0184)	(0.0168)
B. Other conflict variables				
Fatalities in school locality	-0.0007***	-0.0012***	-0.0015	-0.0011*
	(0.0002)	(0.0005)	(0.0011)	(0.0005)
Mean of dep. var.	0.73	64.19	63.37	57.79
SD of dep. var.	0.44	20.79	25.88	22.55
Student controls	Y	Y	Y	Y
School controls	Y	Y	Y	Y
School FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Adj. R-squared	0.120	0.276	0.186	0.344
Observations	146,942	146,942	146,268	146,942

Notes: This table presents estimated coefficients from equation (1) where the obstacles of interest are other barriers (e.g. roadblocks, earthmounds, gates). Scores expressed in standard deviations. All regressions include the following controls: population size of Israeli settlements within 10 km of school locality (in 1000s), student controls (gender, religion, year of birth, study branch) and school controls (number of classrooms, number of students, number of teachers, gender of school). All regressions include school and academic year fixed effects. Standard errors in parentheses, clustered at the school locality level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table D.2: Impact of checkpoints and other conflict measures near school

	Pass	Overall score	Maths	English
	(1)	(2)	(3)	(4)
A. Mobility restrictions				
$\geq$ 1 CP within 10km	-0.0111**	-0.0351**	-0.0594***	-0.0394**
	(0.0056)	(0.0141)	(0.0153)	(0.0159)
B. Other conflict variables				
Fatalities in school locality	-0.0008***	-0.0015***	-0.0018**	-0.0010
	(0.0002)	(0.0005)	(0.0008)	(0.0006)
Prisoners in school locality (100s)	-0.0002	-0.0006	-0.0010*	0.0002
	(0.0003)	(0.0005)	(0.0005)	(0.0005)
House demolitions in school locality	-0.0002	0.0003	0.0004	-0.0023
	(0.0008)	(0.0018)	(0.0025)	(0.0022)
Length of separation wall (km)	-0.0011	-0.0031	-0.0036	-0.0019
	(0.0010)	(0.0028)	(0.0033)	(0.0025)
Mean of dep. var.	0.73	64.19	63.37	57.79
SD of dep. var.	0.44	20.79	25.88	22.55
Student controls	Y	Y	Y	Y
School controls	Y	Y	Y	Y
School FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Adj. R-squared	0.120	0.276	0.187	0.344
Observations	146,942	146,942	146,268	146,942

Notes: This table presents estimated coefficients from equation (1) where the obstacles of interest are checkpoints. Scores expressed in standard deviations. All regressions include the following controls: population size of Israeli settlements within 10 km of school locality (in 1000s), student controls (gender, religion, year of birth, study branch) and school controls (number of classrooms, number of students, number of teachers, gender of school). All regressions include the school and academic year fixed effects. Standard errors in parentheses, clustered at the school locality level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table D.3: Impact of encountering one or more other barrier types (e.g. road-blocks/earthmounds)

	Pass	**Overall score**	**Maths**	**English**
	(1)	(2)	(3)	(4)
A. Mobility restrictions				
Encounters other barrier	-0.0036	-0.0091	-0.0044	-0.0144
	(0.0060)	(0.0131)	(0.0148)	(0.0120)
B. Other conflict variables				
Fatalities in school locality	-0.0007***	-0.0012**	-0.0017*	-0.0011**
	(0.0002)	(0.0005)	(0.0009)	(0.0004)
Fatalities in home locality	0.0001	0.0005	0.0010	0.0005
	(0.0002)	(0.0004)	(0.0007)	(0.0004)
Mean of dep. var.	0.73	64.19	63.37	57.79
SD of dep. var.	0.44	20.79	25.88	22.55
Student controls	Y	Y	Y	Y
School controls	Y	Y	Y	Y
Home locality FE	Y	Y	Y	Y
School locality FE	Y	Y	Y	Y
Adj. R-squared	0.107	0.256	0.165	0.327
Observations	146,942	146,942	146,268	146,942

Notes: This table presents estimated coefficients from equation (2) where the main independent variable is defined as encountering one or more other barrier types on the road to school. Scores expressed in standard deviations. Mean and standard deviation of untransformed dependent variables (e.g. exam scores) presented in the first two rows. All regressions include the following controls: population size of Israeli settlements within 10 km of school locality (in 1000s), student controls (gender, religion, year of birth, study branch) and school controls (number of classrooms, total number of students, total number of teachers, gender of school). All regressions include the following fixed effects: home locality, school locality, distance bins, and year fixed effects. Standard errors in parentheses, clustered at the home-school locality pair level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table D.4: Impact of encountering checkpoints (inc. home-school locality pair fixed effects)

	Pass		Overall score		Maths		English	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. Mobility restrictions								
Encounters checkpoint	-0.0308**	-0.0304**	-0.0764***	-0.0764***	-0.0773***	-0.0779***	-0.0671***	-0.0680***
	(0.0134)	(0.0134)	(0.0260)	(0.0253)	(0.0280)	(0.0274)	(0.0237)	(0.0232)
B. Other conflict variables								
Fatalities in school locality	-0.0006***	-0.0008***	-0.0012**	-0.0016***	-0.0016*	-0.0020***	-0.0010**	-0.0015***
	(0.0002)	(0.0002)	(0.0005)	(0.0005)	(0.0009)	(0.0008)	(0.0004)	(0.0005)
Fatalities in home locality	0.0001	0.0001	0.0005	0.0006	0.0008	0.0009	0.0005	0.0006
	(0.0002)	(0.0002)	(0.0004)	(0.0004)	(0.0007)	(0.0006)	(0.0004)	(0.0004)
Mean of dep. var.	0.73		64.19		63.37		57.79	
SD of dep. var.	0.44		20.79		25.88		22.55	
Home-by-school FE	Y	Y	Y	Y	Y	Y	Y	Y
School FE		Y		Y		Y		Y
Adj. R-squared	0.109	0.122	0.258	0.279	0.168	0.190	0.329	0.347
Observations	146,942	146,942	146,942	146,942	146,268	146,268	146,942	146,942

Notes: This table presents estimated coefficients from equation (2) where the additive home and school locality fixed effects are replaced with home locality-school locality pair fixed effects. Scores expressed in standard deviations. The remaining controls (student and school) and fixed effects (distance bins and year) are the same as in the baseline regression. Standard errors in parentheses, clustered at the home-school locality pair level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table D.5: Impact of encountering one or more checkpoints (multi-way clustering)

	Pass	**Overall score**	**Maths**	**English**
	(1)	(2)	(3)	(4)
A. Mobility restrictions				
Encounters checkpoint	-0.0305***	-0.0714***	-0.0727***	-0.0529**
	(0.0089)	(0.0243)	(0.0267)	(0.0223)
B. Other conflict variables				
Fatalities in school locality	-0.0007***	-0.0012**	-0.0017*	-0.0010**
	(0.0002)	(0.0006)	(0.0009)	(0.0005)
Fatalities in home locality	0.0001	0.0005	0.0010	0.0005
	(0.0002)	(0.0005)	(0.0008)	(0.0003)
Mean of dep. var.	0.73	64.19	63.37	57.79
SD of dep. var.	0.44	20.79	25.88	22.55
Student controls	Y	Y	Y	Y
School controls	Y	Y	Y	Y
Home locality FE	Y	Y	Y	Y
School locality FE	Y	Y	Y	Y
Distance bins FE	0.107	0.256	0.165	0.327
Year FE	146,942	146,942	146,268	146,942

Notes: This table presents estimated coefficients from equation (2). Same specification as the baseline specificatoin, except that the standard errors (in parentheses) are multi-way clustered at the home and school locality level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

D.2 Other confounding factors

Sample selection of students sitting exams. Conflict may affect the sample of students who enrol in secondary school or affect the subset of students who actually sit the exam. To examine whether sample selection due to conflict intensity is likely, we follow Brück et al. (2019) and perform two tests. First, we use the PLFS to regress school attendance among 17 to 19 year old students in locality l on conflict measures B_{lt} and $F_{l,t-1}$ of equation (1) in that locality, conditioning on locality fixed effects. These results are presented in column (1) of Table D.6. The results indicate that a high proportion of students attend school (92.7%) and provide little evidence that increased exposure to checkpoints within and around the locality affects levels of school attendance. For example, the estimated impact of the introduction of at least one checkpoint within 10 km of the school locality centroid is negative (-0.011) but statistically insignificant (p-value=0.378). Additional fatalities in the locality and increases in the Israeli settler population also do not affect school attendance rates.

Second, we use the schools data to examine determinants of school-level drop-out rates. We regress the school drop-out rate, reported in the schools data, on conflict measures, locality controls, school, and academic year fixed effects. These results are shown in column (2) of Table D.6. The first row above the column numbers shows that the school drop-out rate is low (3.1%). Estimates in panels A and B also indicate that increases in checkpoints and fatalities in the school locality do not appear to affect the school dropout rate.

Endogenous mobility. Another concern is that higher-ability students move to localities with fewer conflict infrastructures in response to increased conflict intensity or move to localities nearer their school in order to avoid high commuting costs. Anecdotal evidence suggests that internal and external mobility was severely restricted in the West Bank over our sample period (Central Intelligence Agency, 2008; World Bank, 2007a). To examine this further, we first use the 1997 and 2007 Palestinian census to document patterns of mobility. Across these two census years, roughly 25% of individuals report ever having lived in a locality that is different to their current residential locality. Of those who have moved, the majority report having moved for marriage (18.56% of ever-movers, most of whom are females) or to accompany a family member (36.69%). Fewer than 2.3% of ever-movers report having moved for study-related reasons. Furthermore, among this 2.3%

Table D.6: Sample selection and endogenous mobility tests

	Sample selection		Endogenous mobility	
	Attend school	Drop out	Move local	Move local
	(1)	(2)	(3)	(4)
Data source	PLFS	Test score	Census	PLFS
A. Mobility restrictions				
$\geq$ 1 CP within 10km	-0.011	0.002	-0.004	-0.000
	(0.012)	(0.002)	(0.009)	(0.000)
B. Other conflict variables				
Fatalities in locality	-0.000	0.001	0.000	-0.000
	(0.000)	(0.001)	(0.000)	(0.000)
Mean of dep. var.	0.606	0.031	0.276	0.002
Demographic controls			Y	Y
Locality FE	Y		Y	Y
School FE		Y		
Year FE	Y	Y	Y	Y
Adj. R-squared	0.510	0.569	0.794	0.048
Observations	1,730	2,865	1,186	171,811

Notes: All regressions include the controls for population size of Israeli settlements within 10 km of locality (in 1000s). Columns (3) and (4) includes additional controls for gender and age of respondent in the PLFS. Standard errors in parentheses, clustered at the locality (columns 1, 3, and 4) or school (column 2) level.

who moved for study-related reasons, the median (mean) age is 22 (23), suggesting that they are likely to be university rather than high school students.

To more formally examine the determinants of locality-to-locality movement, we first construct locality-level mobility rates as the proportion of residents in that locality who have lived in a different locality. We then regress these locality-level mobility rates on exposure to conflict, locality fixed effects, and census-year fixed effects.[50] The results, presented in column (3) of Table D.6, provide no evidence that an increase in exposure to checkpoints increases rates mobility. There is also no evidence that exposure to fatalities or prisoners increases rates of locality-level mobility.

Second, we use the rotating quarterly panel nature of the PLFS to investigate whether year-on-year migration across localities can be predicted by exposure to conflict. For individual i living in locality l and interviewed in year t, we examine whether exposure to conflict in year $t-1$ leads

[50]Since the first year of available data for checkpoints is 1995, for mobility restriction measures, we use changes in exposure to checkpoints between 1995 (matched to the 1997 census) and 2006 (matched to the 2007 census). We use the same time period change for other conflict measures for consistency.

the individual to move localities in the next survey wave in year $t + 1$.[51] In these models, we include home locality fixed effects to control for selection into residential location and individual characteristics such as age, gender, and educational attainment. These results, presented in column (4) of Table D.6, firstly indicate that year-on-year mobility is low. Only 0.2% of the sample are recorded as having moved locality over the time frame they are surveyed. Second, there is no evidence that increased exposure to mobility restrictions or fatalities leads to a higher probability of moving localities between periods t and $t + 1$.

Reverse causality. To check whether reverse causality could be a threat to our identification strategy, we regress the number of checkpoints within a 10 km radius of the locality centroid on lagged or contemporaneous measures of either the average pass rate and the overall score (measured in standard deviations). We control for the number of fatalities in the locality, the population size of Israeli settlers within a 10 km radius of the school locality, and locality and year fixed effects.

The estimates, presented in panel A of Table D.7, provide no evidence that the number of checkpoints is determined by either contemporaneous (columns 1 and 2) or lagged (columns 3 and 4) educational outcomes. For example, the estimated coefficients on the contemporaneous and lagged pass rates are -0.163 and 0.146 respectively, both insignificant at the 10% level. The coefficients on contemporaneous and lagged overall TGE scores are also statistically insignificant, suggesting that reverse causality is unlikely to be a serious concern. Panel B shows that an important factor for determining the number of checkpoints is the population size of Israeli settlers within 10 km of the locality centre, as discussed in Section 2 and depicted in Figure 1 of the main paper. Since we include locality fixed effects, the estimates suggest that increases in the number of Israeli settlers are followed by increases in the number of checkpoints. It is worth emphasizing that all of our regressions control for the settler population size via the vector P.

[51] In regressions where we use conflict in year t as our measure of conflict exposure, the estimated coefficients are quantitatively and statistically very similar.

Table D.7: Reverse causality test

	Dep. Var.: **Number of CP within 10km**			
	(1)	(2)	(3)	(4)
A. Educational outcomes				
	Contemporaneous		Lagged	
	Pass	Overall score	Pass	Overall score
	-0.163	-0.017	0.146	-0.065
	(0.416)	(0.201)	(0.452)	(0.225)
B. Other conflict variables				
Fatalities in locality	0.009	0.009	-0.008	-0.009
	(0.025)	(0.025)	(0.029)	(0.029)
Israeli settler population	0.057*	0.057*	0.047	0.048
	(0.033)	(0.033)	(0.034)	(0.034)
School locality FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Adj. R-squared	0.647	0.647	0.670	0.670
Observations	1,589	1,589	1,309	1,309

Notes: All regressions include school locality and year fixed effects. Settler population measured in 1000s Standard errors in parentheses, clustered at the locality level.